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PERSONAL

Computer

NEWS

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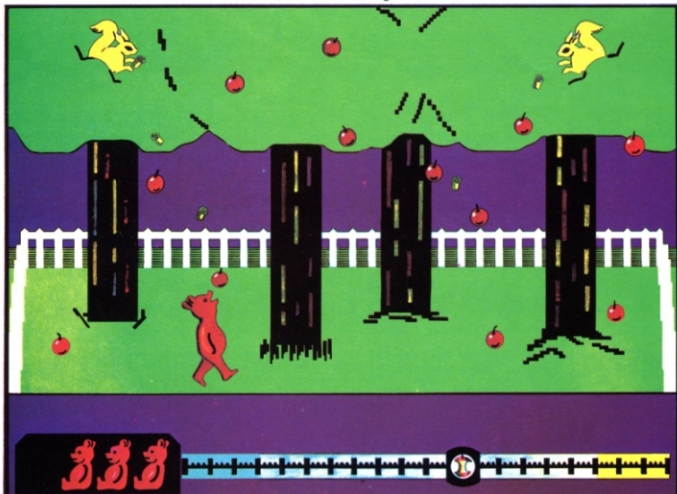
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Welcome to the new-look *PCN* — the most dramatic transformation since Clark Kent stepped into a telephone booth.

We've kept all your favourite features — the most up-to-date news pages in the business, the searching Pro-Tests of software, hardware and peripherals, your letters, hints and tips, and questions.

But we've added a lot too.

You'll find more than a dozen pages every week of things to do on your machine. Every week we'll have something for Spectrum, Commodore and BBC owners. But loyalists of other machines aren't forgotten. Whether you're interested in personal computing for games, business or just for its own sake, *PCN* is the magazine to read.

Wherever it happens, if it affects you, we report it in the Monitor pages. Home news, events and analyses, with regular columns from where technology makes waves — the USA and Japan. Plus a regular look at the British micro scene in Home Front.

COVER STORY

Commodore 64 exposed 32
With lots of new machines getting all the press we thought it was time to look back at some old favourites. First under the spotlight is the Commodore 64.



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Industry idiocies, the great *PCN* Misprints and downright malicious gossip.

Acorn wins its laurels

Little Acorn finally makes it into the oak tree league today (Wednesday) with the launch of no fewer than eight business systems.

Its first complete new systems since the Electron start with an intelligent terminal and rise through a range to a 80286-based machine that gives IBM's PC AT a run for its money on paper.

The machines will be demonstrated at the *Personal Computer World Show*. There are a terminal, a stand-alone word processor, a pair of bundled small business systems, two out-and-out number crunchers, and a couple of systems that host Acorn straight into competition with IBM and the business hoses.

Acorn hasn't settled on prices yet, but it expects to start delivering the machines in January. The largest, according to marketing manager Tom Hohenberg, could cost about £3,500.

For that you're offered a 256K system with 700K on diskette and a 10Mb hard disk. This, designated the 310, also has a colour monitor, all powered by the Intel 80286 that IBM's AT uses. Besides the colour it also exceeds IBM's machine for applications software. Acorn has opted for Digital Research's Concurrent DOS, which offers a degree of compatibility with MSDOS, PC DOS, and CP/M-86, and it follows Apple's lead by includ-

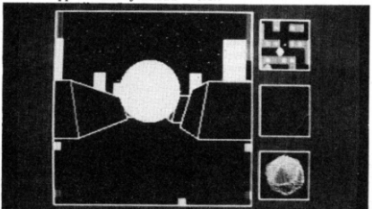
ing Desktop Manager, a mousey program apparently inspired by the Macintosh.

Apart from the terminal and the word processor the new systems all come in pairs. The 100 and 110 are Z80, CP/M machines packaged with word processing, spreadsheet and database software. The 200 and 210 are driven by National Semiconductor's 32016 processor and this section of the development program has been held up by supply problems with this chip.

These two systems have 256K of RAM, as do the 300 and 310. Throughout the range, the 10 indicates that the machine has a colour monitor and a Winchester disk drive. All the systems have the same physical construction — a separate keyboard and one box for the system, the monitor and the drives. We are reliably informed that, in a break with Acorn tradition, the cabinets are black and gold.

Acorn isn't remotely daunted by the prospect of taking on IBM on its own turf. Hohenberg claimed that the company already has 12 per cent of the UK small business market with BBC micros and various additions. It also has an iron in the fire with Torch, whose Graduate is due to be delivered in November.

But it acknowledges that there is much work to be done appointing and training dealers.

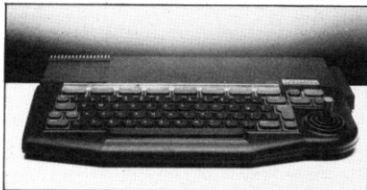


Here's a teasing glimpse of a Spectrum game, *Hedron*, which is nearly ready for release. It's being written by a new software house, Union Science, and should be released before Christmas. The company hopes to show a demo version at the *Personal Computer World Show* this week.

Featuring some very complex 3D graphics manipulations the game holds out the promise of substantial prizes. You move around a large maze in which a central computer is hidden — your target is to destroy it. Around the maze gargantuan spheres left over from The Prisoner force you into detours. There are also towers dotted around, and while they can be destroyed, this changes the tower configuration in other parts of the maze.

The game should cost £6 or £7, and we'll be featuring a Star Game review as soon as we can.

Eyes down, look in to the show



Enterprise — now you see it . . .

Roll up, roll up for the great PCW Show. Undoubtedly the micro show of the year.

This time around it has switched from the cramped and austere delights of the Barbican Centre to the more spacious

surrounds of Olympia 2 (Olympia tube, then follow the signs).

The show opens to the public tomorrow (Thursday) and runs through to Sunday. Check your bank overdraft before coming, as a stiff £3.50 will be required

Acornsoft in orbit with Elite

If you can picture a spacecraft simulator in 3D, arcade-style space battles and a trading strategy game all rolled into one you have a picture of what Acornsoft's new game Elite has to offer.

The object of the game is to achieve the status of 'Elite', reserved for those who have successfully fought and traded their way across eight galaxies.

And if you think that's an easy task, think again. Apparently, staff at Acornsoft have been playing the game for four months and even the game's designers (Ian Bell and David Braben) have not achieved a rating higher than 'competent'. There is still

'dangerous' and 'deadly' to go before they reach 'elite'.

Acornsoft is running a competition to find the most skillful players. It isn't the kind of game you will get through in one sitting and a save routine is provided to enable you to continue from where you left off.

Included with the game is a 60-page 'traders training manual' and a short story based on the game.

It is priced at £17.65 on disk, £14.95 on tape and £12.95 on tape for the Electron.

If you want to find out for yourself how good the game is go to the Acorn stand at the PCW Show where Elite will be on continuous demonstration.

to gain admittance (under 12s get away with £1.50).

We hope you'll find the time to visit the PCN stand where our team of computerdocs will be available for instant consultation on your micro problems. And you can have a go at the PCN game challenge and win those Prism Movis, modems and an Amstrad CPC464. If you time it right you could take up a challenge from BBC Chip Shop presenters.

To avoid crowds steer clear of the Acorn stand (where Acorn's Business Computer will be displayed in all its glory — see page 1), the Acornsoft stand (where the arcade addicts will be climbing over themselves to get a look at Elite) and the Enterprise stand (where the long-promised Enterprise micro will be going through its

paces for the second year).

For those who enjoy treasure hunts there are rumoured to be several MSX machines to be seen but the organisers refuse to say which and how many.

Other machines that you may have heard about but not yet had the chance to see include the QL and the Amstrad — now sporting 3in disk drives, CP/M and Logo.

On the software front anybody who's anybody is promising new games for the Christmas sales season — and that includes Activision, which is launching its top titles on tape for Sinclair owners.

And if you are looking for the chance to win prizes (besides ours) check out Lothlorin, which is giving away a free holiday, and Domark, which is giving away £25,000.

Why are we waiting?

What tasty morsels have you been promised recently? Why are we waiting will be a regular feature to turn the spotlight on people who have promised but haven't delivered yet. Let us know if you're hanging on for something that hasn't turned up. For example:

Enterprise 64 — launched September 1983 for delivery April 1984, to be re-launched at the PCW show, due to be in the shops by the end of November.

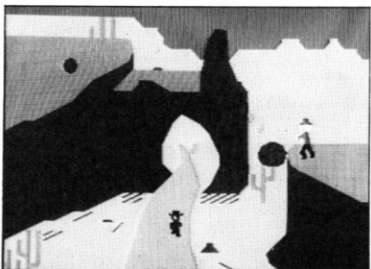
Amstrad disk drives — advertised now, to be shown at the PCW show, due to be in the shops by the end of November.

Great Space Race — Legend's follow-up to Valhalla, advertised now 'coming soon'.



Acornsoft makes elitism respectable.

HIGH ROLLER — This is a screen shot from New Generation's latest release on the Commodore 64, 'Cliffhanger'. The game was launched on September 19 and will be on sale at the PCW show for £7.95. The shot shows the hero, Cliff, pushing a rock on to the bandit in the canyon below. Killing of the bandit is the aim in all five levels of the game, and there are a number of techniques and tools Cliff can employ. Also on show will be the Trashman sequel, Travel with Trashman. This takes the action of the earlier game abroad, featuring litter collection in such unlikely sites as Benidorm and New Orleans. The background graphics are better and more varied than those in Trashman and the game will cost £7.95.



MSX software battle lines drawn

A good old-fashioned slugging match is on the cards with software companies preparing for the MSX wave from Japan.

In the red corner is the tag team of Mastertronic, Llamasoft and others who plan to release MSX software at the usual prices. In the blue corner

are Activision and new company Electric Software, with games from £9 to £12.

Activision explains the £11.99 tag on its first six titles by a reference to the small number of MSX machines it expects to be sold this year. It also talks about quality and

creative programming. Electric Software is producing games for sale at £8.95 and says: 'The programs use the machines' capabilities to its full extent.'

Both get a raspberry from Llamasoft's Jeff Minter. 'We will be selling MSX programs at about £5 — like any Vic 20 or 64 programs. But, of course, it

depends on the complexity of the program,' he said.

Mastertronic, as usual, will be rocking the boat with bargain basement prices. Its Space Walk and BMX Racers, due to be ready by mid-November, will cost £1.99.

And the machines themselves? The European launch of MSX is due this week.

Lightning forks

Lightning might not strike twice in the same place but White Lightning is starting to look like pattern bombing.

Oasis Software (0934-419921) has added four versions to the original that we Pro-Tested in issue 74.

Microdrive White Lightning for the 48K Spectrum costs £19.95.

Basic Lightning for the Commodore 64 costs £14.95.

Machine Lightning for the Commodore 64 costs £29.95.

In addition, there's the original for the Commodore 64.

QL add-ons star at ZX Microfair

The latest ZX Microfair's unique blend of scrum and street market hit London's Alexandra Palace last week with a star attraction — the QL and matching accessories.

GST, of course, was there demonstrating its alternative operating system and assembler for the QL (issue 77). And suppliers like Adapt Electronics were offering the Cub RGB monitor from Microvitec that has been configured to work with the QL's high resolution screen.

Spectrascan Software appeared to be laying claim to the title of 'first with QL games'. On offer were Golf, Othello/

Connect4 and 3D Maze. They are available at £12 each; but you can buy all three on one Microdrive cartridge for £26.

Talking of Microdrive cartridges, Transform (01-658 6350) has a neat box that tidily organises your cartridges. It costs £5.95 and holds 20 tapes.

Disks for the Spectrum were very much in evidence. Technology Research was selling its single and double density disk interfaces at £77.25 and £89.25 respectively. It also has a special offer on that lasts until October 31. For £199.99 it is selling an interface and disk drive.

Also pitching in at the £199 level was Thurnall with its 3in disk system. The best deal of the lot was from Primalord Peripherals which was selling a boxed Shugart drive and an interface for £179.

On the printer front, Cambridge Computing was showing an intelligent Centronics printer interface.

Priced at £45 it includes software on ROM (no more loading of printer driver software from tape).

One of the drawbacks of the Spectrum is the lack of a colour monitor output. You can now get a high quality output with an RGB module from Adept that plugs into the expansion port. It costs £29.95.

Adventure fans were offered an excellent bargain on the Dream Software stand. Its Dungeon Builder program lets you design your own adventures. For £9.95 you get a sophisticated piece of software that includes the ability to create colour pictures, add text and logic and play or save the game.

IBM has trimmed the price of its PC XT by 18 per cent and from November will offer a form of Unix called the Interactive Executive (IX) on its hard disk PC.

The XT now costs £2,828, and IX £828. Even so, it will be struggling to hold its own with the 256K 80286-based AT, launched in the UK last week at £2,951. In typically carefree IBM style, IX will not be compatible with the Xenix offered on the AT. So much for Unix transportability.

Oric Products' creditors have given the company a qualified vote of confidence after an informal meeting to discuss its debts (issue 77).

The sting in the tail lies in the fact that their support for Oric is based more on its potential abroad than in the UK.

Prism's Wren portable is growing by leaps and bounds with a memory upgrade and disks.

For £399 you can turn 64K into 256K, and double-sized double-density disks will cost £345 to current users.

Following the lead of Software Projects (issue 77) Cheetaahsoft has turned its paw to translating US games for UK micros.

Its agreement is with Imagic (no relation to Imagine!) and it has started with two arcade games for the Spectrum.



LOOKING ON THE BRIGHT SIDE — Commodore expects to have its new C16 and Plus/4 micros in the shops by the end of the month.

But at a demo last week the ROM-based software on some of the Plus/4s was apparently being loaded from disk, and packages for the C16 were thin on the ground. The C16 first turned up in Europe almost six months ago at the Hannover Fair and the Plus/4 three months ago. Why are they so ill-prepared after all this time?

The Plus/4, Commodore helpfully points out, will run any software designed for the C16. But what it doesn't stress is that neither will run any of the software written for the Vic 20 or the G4. They are both in the position of any new micro, largely dependent on software producers to get behind them, with the disadvantage of following two machines that still sell strongly and that command a large software following. It could be a slow take-up.

VIEW FROM JAPAN



Modems in a land of the ancients

By Serge Powell

If things work out properly this will be my first column transmitted by means of a modem. I'd say 'with any luck', but luck should have no place where the miracles of technology are concerned.

If my experience of modems to date is any guide, I'd say the odds are about even (no pun intended). Computer-to-computer or computer-to-bulletin board communication is just catching on over here. Mostly, it seems, it's happening among the foreigners or English-speaking (more accurately, English-writing) Japanese, thanks to that recurrent problem, Kanji — Chinese characters — which are beyond the

limits of ASCII code. But even for those of us content to use English there are complications.

The particular network that I've joined is operated out of the Sanno Hotel, which is best described as a facility since it's run by the American military in Japan. It provides their people with a place to stay in Tokyo.

As usual, a variety of suppliers have concessions: among them is Corton Computers, which as part of its services operates Cort Net. The attraction of Cort Net is that membership is free to anybody with a micro and a modem, and that's where the complications set in.

Being a US facility serving US military personnel from the sundry bases in Japan — or, via its phone network, anywhere in the world — things at the Sanno are done the American Way. This means that Cort Net couplers use the Bell 103 system, whereas Japanese units that give you access to most of the rest of the world use the CCITT standard. Needless to say, the two are incompatible.

In order to communicate with Cort Net, you need an American coupler, something not readily available in Japan.

Or do you? Japanese manufacturers, designing for the world as they do, build multiple capability into their equipment: 50/60 cycles, PAL, SECAM, and NTSC television protocols and so on. Epson, a company well known for computers and peripherals, has built dual capability into its CP20 portable acoustic coupler so that it uses one set of circuits for local and European markets and a second set for the US. It's a simple matter to remove the connector installed by Epson and replace it with a switch, to make it easier to communicate in either Bell 103 or CCITT; this also makes it easier to communicate with networks in the US without losing other facilities.

The switch, incidentally, could help you sleep more easily if you suspect your phone is being tapped.

So — having acquired a CP20, and gone to all the trouble to broaden my horizons beyond Japan (and PCN) in the original CCITT mode, how much have I really gained?

Apart from the opportunity of running up a \$300-\$400 phone bill every month from accessing The Source, I can immediately reply to messages from friends.

Well, almost immediately. Now, instead of phoning, I can simply E mail a message by loading the comms program and opening my trap file for incoming mail — roughly 15 seconds — and phone the Sanno Hotel switchboard to ask to be connected to the network — the work of anything from a minute to three hours. I enter my password and the last two digits of my phone number — 25 seconds — and enable the upper/lower case capability of the network, re-setting the screen defaults from 40 to 80 columns. Then I input the first and last names of the person I'm calling, and key in the message if it's simple, like 'let's have lunch tomorrow'.

If it's more involved I can call up a pre-written file that's free of all the garbage WordStar uses.

All that's left to do is send the message and hope that the person it's intended for checks his mail before the time specified for the meeting or the lunch.

Come to think of it, I'd better confirm the appointment with a phone call.

Isn't progress wonderful? Or do you ever feel that somebody's having you on?

Micros go cheap in sale

More micros than you could shake a stick at came under the hammer in London last week but very few went for a song. With dismal regularity the bids at Crocker Computer Auctions inaugural auction failed to reach the reserved price.

Three hundred lots of new and used micros, peripherals and software were assembled for the auction, which is planned to be the first of a series. There were piles of ZX81s, packaged Vic 20s, Spectrums

long decanted and in some cases chipless, a brace of BBCs, and proud representatives of the business market — an IBM PC, a Macintosh, a Kaypro 10 and even an Apple 11c.

If you weren't there you missed the chance of a brand new Mac for £800, a Lynx for £20, and a BBC with DFS for £310 among others. But more were withdrawn than were sold as sluggish bidding cast a pall on the proceedings.

At first there'd been an air of expectancy. 'We're here to sell them, not stock them,' said the auctioneer; but he added guardedly: 'Not for pennies and ha'pennies, of course.' As the bidding got under way and his pleas for 'sensible bids, ladies and gentlemen' became more frequent, there was a muttering from the back of the hall: 'It's a rub-out, a waste of time.'

Robert Nicklin, general manager of Crockers, said afterwards: 'It takes two to make an auction. A lot of people (that's a lot in a crowd, not an item to be auctioned) seemed frightened about bidding.' But the



One careful owner, good runner — the durable Commodore Pet.



'Any advance on £10 for a 48K Lynx?'

auction ran its course, and eventually was sufficiently successful for Crockers to plan another for late October.

The stock, he said, was largely private entries from individuals. Several items were brand new, but those that weren't had been examined by Crockers technicians. An engineer's report on a couple of Spectrums said: 'Machine at fault — chips missing' but they sold, all the same.

For the record: the Macintosh was unsold, the PC failed to reach its reserve price, £210 wasn't enough to buy an Epson MX100, but £30 would have bought you a Sord M5, £15 a Casio PB100, £190 a BBC, and £310 a BBC with DFS.



Star exhibits — not a lot for a pair of weather-proofed BBCs.

HOME FRONT

Here is a pre-announcement — and what you can do with it

Legality, decency, truthfulness and honesty. These are the four pillars of the Advertising Standards Authority and they are supposed to protect you from misleading or simply false advertisements.

The idea is that when you hand over money in response to an ad, two things happen — the goods will arrive and they'll perform as they are supposed to. Pie in the sky? You could be forgiven for thinking so in this business.

The weakness of the ASA as a watchdog is that it has no teeth. Even its most ferocious display of bared gums is ineffective if the worst it can do is to uphold a complaint.

An ASA report earlier this year concentrated on complaints against computer equipment advertisers. The problem, it said, 'is the inevitable outcome of the fast and furious growth of the market and the chaos that attended it.'

There should be nothing inevitable about blatant dishonesty and it should be a simple matter to slap a salutary fine on any advertiser trying to take advantage of chaos. Nothing of

the sort happens. Miscreants may attract some undesirable publicity but by then the chances are that they've banked your money anyway.

In this issue we kick off another toothless watchdog — Why are we Waiting will be a regular feature to embarrass manufacturers who've announced products they aren't ready to deliver. Embarrassment is the most we can hope for, but eventually it might help remind them of their responsibility to you.

It tackles a particular kind of advertisement or launch. Most ads try to get you to part with your money, but some try to make sure it stays in your pocket — until they're ready to take it. An ad that promises something 'coming soon' is telling you not to buy any alternative in the meanwhile. It's called pre-announcing.

It happens all the time, sometimes by accident or through incompetence but too often with malice aforethought. Hold on to your cash, the manufacturers say, and we'll get this marvelous new device to you in a twinkling of an eye or b 28 days

If an advertisement is wrong we're here to put it right.

If you see an advertisement in the press, in print, on posters or in the cinema which you find unacceptable, write to us at the address below.

The Advertising Standards Authority ✓

ASA Ltd, Dept 3 Brook House, Torrington Place, London WC1E 7HN

or c three months or d next Preston Guild.

It's as much part of the computer industry as fir trees are of Christmas — the 'fast and furious growth' again. When a mini or mainframe's price runs to six figures or more, no maker is going to want buyers to shop elsewhere while it puts the finishing touches to the system. But that's no reason why we should tolerate it from home micro equipment makers.

Companies like Amstrad and Tatung deserve a pat on the back for getting new systems into the shops exactly when they said they would. Those that deserve a knife in the back would keep what's left of the Sheffield steel industry busy for months.

The usual reason is sheer pressure of competition. There are so many competing suppliers that a lost month here or there between finishing a product and getting it into the shops can mean the difference between making a killing or making a dud. So, ever optimistic, they take a chance and announce the product before it's ready. Sometimes, if luck is on their side, they'll get the product out before anybody complains — but if product development runs its normal course there will be delays. Then the worst that can happen is that the self-regulating advertising industry will rap their knuckles, usually several months later.

It isn't nearly good enough.

CHARTS

TW	LW	TITLE	PUBLISHER	MACHINE	PRICE
1	6	Daley's Decathlon	Ocean	SP, C64	£7.90
2	7	Monty Mole	Gremlin	SP, 64	£6.95
3	1	Decathlon	Activision		£9.99
4	3	Full Throttle	Micromega	SP	£6.95
5	5	Beach Head	US GOLD	C64	£9.99
6	4	Match Point	Pision	SP	£7.95
7	2	Sabre Wolf	Ultimate	SP	£9.95
8	8	Micro Olympics	Database	SP, C64, AC	£6.95
9	10	Lords of Midnight	Beyond	SP	£9.95
10	9	Jet Set Willy	Soft Projects	SP	£5.95
11	11	TLL	Vortex	SP	£5.95
12	12	Arabian Nights	Interceptor	C64	£7.00
13	16	Potty Pigeon	Gremlin	C64	£7.95
14	18	Olympicon	Hitech	SP	£5.95
15	13	Mugsy	Melbourne	SP	£6.95
16	—	Astro Chase	Statesoft	C64	£8.95
17	17	Psytron	Beyond	SP	£7.95
18	—	Star Trader	BugByte	SP	£6.95
19	21	Stop the express	Pision	SP	£5.95
20	—	Hero	Activision	C64	£9.99

SPECTRUM

TW	TITLE	PRICE
1	Monty Mole	£6.95
2	Full Throttle	£6.95
3	Match Point	£7.95
4	Sabre Wolf	£9.95
5	Lords of Midnight	£9.95
6	Jet Set Willy	£5.95
7	TLL	£5.95
8	Mugsy	£6.95
9	Psytron	£7.95
10	Star Trader	£6.95

COMMODORE

TW	TITLE	PRICE
1	Daley's Decathlon	£7.90
2	Decathlon	£9.99
3	Monty Mole	£6.95
4	Beach-head	£9.99
5	Arabian Nights	£7.00
6	Potty Pigeon	£7.99
7	Astro Chase	£8.95
8	Hero	£9.99
9	Loco	£7.95
10	Int. Football	£9.95

TOP TEN OVER £1,000

TW	LW	MACHINE	PRICE	DISTRIBUTOR
1	1	IBM PC	£2,390	IBM
2	2	Apricot	£1,760	ACT
3	5	Televideo TS1603	£2,640	TH
4	3	Compaq	£1,960	Compaq
5	4	Apple III	£2,755	Apple
6	7	Sirius	£2,525	ACT
7	6	Wang Professional	£3,076	Wang
8	—	HP 85	£1,917	HP
9	10	NCR Decision Mate V	£1,984	NCR
10	8	Kaypro	£1,604	Kaypro

TOP TEN UP TO £1,000

TW	LW	MACHINE	PRICE	DISTRIBUTOR
1	1	Spectrum	£99	Sinclair
2	2	Commodore 64	£199	CBM
3	5	Electron	£199	Acorn
4	7	Amstrad	£349	Amstrad
5	3	BBC B	£399	Acorn
6	4	Vic 20	£140	CBM
7	—	Amstrad	£299	Amstrad
8	9	Atari 800XL	£199	Atari
9	6	Memotech	£199	Memotech
10	8	Oric	£99	Oric

These charts are compiled from both independent and multiple sources across the nation. They reflect what's happening in high streets during the week up to September 13. The games chart is updated every week. Neither mail order nor deposit-only orders are included in these listings. The prices quoted are for the no-frills model and include VAT. Information for the top-selling micros is culled from retailers and dealers throughout the country and is updated every month. PCN Charts are compiled exclusively for us by RAM.C, who can be contacted on 01-892 6596.

COMCON

Programmable Joystick Interface for the Spectrum
£19.95
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The sinister secret of the bionic brain



I have uncovered information which leads me to believe that the Bionic Man's brain is not a six million dollar device, as claimed, but in fact an unexpanded ZX80. Proof of this is due to certain photos and drawings of Steve plugged into the so-called Portable Bionic System. I believe this to be a clapped out tape recorder, used to load programs into the ZX80.

We all know that the ZX80 works faster when it's doing very little. Well, you watch a television program with old Steve in it. Whenever he does anything bionic he goes into slow motion.

If I am correct (which I am — cough —), then this would be one of the biggest cons ever. The men with the technology to rebuild the world's first bionic ZX80 would have made off with six million dollars, probably of tax-payers' money. That figure doesn't include the profits from the TV series.

During the series some shots were taken through Steve's bionic eye. The only way such shots could have been taken is from within Steve's nut. So the old ZX80 can't be in there, which means it's probably in his arm, alongside his 3V Meccano elbow joint.

If you still don't believe me, watch his eyes. Every now and then an 'OUT OF MEMORY' message pops up, or even the occasional 'SYNTAX ERROR IN 2'.

Then out came the megabright-sub-station controller, the 1K ZX81, with about 16 chips less than the ZX80 and a lot cheaper too. One of the men with the technology, etc was probably blackmailed by his wife into building a bionic woman called Jane. (Had they been watching too many Tarzan films?).

Of course, not wanting to use up too much of the con money, they bought a ZX81 and plugged in one of those Micro Command things (a supposedly bionic ear).

When the Spectrum popped up, they built a bionic dog, and with 48K it was a lot more

If something we've said has outraged, amused or impressed you, this is your chance to answer back. To celebrate the new-look PCN we decided to give our 'star' contributors a pay rise — the best letter of the week will now earn you £15. So send in your contributions to: Random Access, Personal Computer News, Evelyn House, 62 Oxford Street, London W1A 2HG.

intelligent than both Steve and Janie.

But the big question remains: what next? Will they build a bionic QL or will the only thing they'll be able to improve be the delivery time? Not kidding Clive. . .

Dean Arnett,
Hunstanton, Norfolk

Bugged by Basic that isn't debugged

I never cease to be amazed by the way computer manufacturers have the nerve to release computers that have not been properly debugged.

Now, I realise how hard it must be to fully debug 32K or so of code, but it should be done. The manufacturers should lend the computer they are about to release to various people, to see if they come across any problems.

Take the BBC for instance. When I bought my BBC about 1½ years ago it was fitted with the OS 0.1. This operating system didn't allow any use of disks, the RS432, the tube, Econet or sideways ROMs, and the BBC was claimed to be expandable. BBC Basic 1 has bugs in it, and even the humble ZX81 has better mathematical accuracies (hence the development of Basic II). To upgrade my operating system cost £10.

It seems that these computer manufacturers expect the people who went out to buy the machine early (on good faith) to put up with anything.

The QL is another computer that is riddled with bugs. On paper it looks an extremely good machine, but in the flesh? Well, that's another matter. Even if you can have 255 colours on the screen at one time (with 'stipples'), as Mr Lawlor is quick to point out in its defence, that is no excuse for a machine that does not do things as it should do.

What is the point of 128K RAM if the Basic needed to use it is lacking, and the documentation is bad?

It seems little wonder that so many companies are in difficulties — people won't buy their machines because the documentation is so badly written (take the Dragon for example), or the machine isn't debugged (the QL). Sinclair's Quantum

Leap seems to be a very small leap indeed — quantum sized in fact.

Simon Spruzen,
Milton Keynes

The gathering of the Dragon users

Further to my letter published in issue 70, there is now a Dragon Users Group which is alive and kicking. A newsletter has been published, and if you'd like one and an application form for the club please write to me at the address below.

Having helped to set things going I can only say that it has been an uphill struggle. We desperately need more members and more ideas from Dragon owners, so get your pens (and cheque books) out and write to me or to Paul Grade of 6 Navarho Road, Worthing, who is provisionally acting as chairman. On a personal note, I'd like to say that I am on holiday for the last two weeks of September — so you might not receive an immediate reply.

J Hoyland,
17 Oxford Road,
Frinton-on-Sea,
Essex CO13 9HX

Sinclair caters to the common man. . .

I should like to say a word or two from the 'Clapham Omnibus', on which the average man is said to ride, about Clive Sinclair and the QL.

First, everything that has been said against his customer relations department is true. It seems to be run by the Ayatollah Khomeini.

However, when people criticise Sir Clive's products, particularly the QL, they seem to forget that he has arguably done the most to enable ordinary, untechnical people like me to compute and to enjoy computing. He was the first to realise that the average user would enjoy his initiation into computing if he could: a) afford to buy a machine without a second mortgage; b) get commands onto the screen with simple key-presses rather than laborious typing; c) read the finished product easily without having to remember to put in spaces and d) edit program lines quickly and easily. Without these features I am certain I

should have given up computing at an early stage. My generation suffers from a nervous reaction to the electronic age which has, unfortunately, tended to persist.

This is why I applaud the QL. Of course it hasn't got 'proper' windows. Of course the Microdrive isn't a serious business proposition. And he definitely shouldn't have advertised it before it was ready.

Surely the point is that Sinclair is the only computer manufacturer to have taken the risks necessary to produce a computer with a mature, exciting and imaginative language on board, for serious programs as standard, 200K of mass storage, a flexible and advanced chip and enormous memory capacity for a sum which I and thousands like me — ordinary, untechnical, 1940s vintage willing amateur — can just afford. The messy bits, the dodginess of the Microdrives, the slowness of the SuperBasic, the 'Is it really a 32-bit machine?' questions are, in my humble opinion, irrelevant to the sort of people who will buy the QL.

If I could run to an all-singing-all-dancing IBM PC with twin floppies and a modem I should no doubt join the chorus of haughty detractors massing around the QL. However, with only limited funds at my disposal, I am more than happy to trade reliability and up-market extras for the QL's affordability.

CR Shute
Sutton Coldfield, W Midlands

. . . so why are we still waiting?

I was amazed to read in PCN (issue 75) that Sinclair is now claiming that the QL will be available in high street shops by next month.

Having placed an order within a few days of Sinclair Research ads first appearing in PCN (issue 46), I have so far received only an apologetic letter from their managing director pleading overwhelming demand and committing Sinclair to delivery by the end of May. I would advise other potential purchasers to be wary.

Peter Mehta,
New Lanark, Lanark.

How to write for Personal Computer News

PCN WANTS YOU!

Whatever you want PCN will try to bring you . . . but we need your help. You tell us you want more programs, more features to help you get the most from your machine. Well, we've listened and we're offering more programs, projects and useful information than any other magazine. But if your machine isn't featured you've only yourselves to blame.

So we're making you an offer you can't refuse. Send us your programs and in return we'll send you upwards of £80 for each one published. We also welcome written contributions — tell us about the ways that you've conquered your machine; your best sound routines, those great graphics features, how you mastered disk and printer.

What we want

We're looking for programs and articles on any aspect of using personal computers — including games, graphics, utilities, and applications.

If you're sending a written contribution we require it in typed form (dot matrix printout is fine), with double spacing on one side of the paper only. Where possible include short, example



programs to illustrate the article.

If you've written a program we require a working version, on tape for any machine, or on disk if you prefer for Commodore 64, Atari, BBC or Apple. We'd also like notes on how the program

works, what it does, and any special features that you've included. A printed listing would be nice but isn't essential — on the other hand we can't consider listings without a working copy on tape or disk.

If you would prefer to make preliminary enquiries before submitting material, you should write — don't phone — to Personal Computer News, Evelyn House, 62 Oxford Street, London W1A 2HG. Questions about articles should be addressed to John Lettice, Features Editor; program queries should go to Nickie Robinson, Programs Editor.

If we decide not to use your contribution it will be returned to you if you enclose a stamped, self-addressed envelope but give us at least six weeks. You should receive payment four weeks after publication.

If you want to enclose photographs and screen shots, feel free to do so but make sure they are of good quality and make them colour transparencies or black and white prints. Do not send colour prints.

So, get cracking. Just think . . . two articles could pay for that printer, disk drive, or even a new machine.

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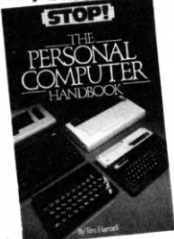
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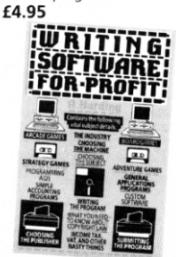
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WP faults on display? Not with the 600XL

Q I have recently become the owner of an Atari 600XL but find the machine will only display 40 columns of text while the larger Atari printers will take 80 columns or more.

A As I wish to use the computer for word processing, is there a machine code routine or short program which will give an 80-column display on my computer?

A Anderson, Isleworth, Middlesex.

A Most computers intended for the home market are limited to 40 columns simply because domestic TV sets will not cope with more detailed displays. Indeed the Spectrum has only 32 columns, the Vic 20 a mere 22. The discrepancy between the display and the printer is not a prohibitive factor for word processing; in fact it is much easier to read 40 than 80 columns, even on a high-resolution monitor.

The only advantage in the use of 80 columns for word processing is that you can see on screen exactly how the document will look when printed.

For a true 80-column display you need hardware modifications and the expense of a dedicated monitor.

For home and semi-serious word processing, your 600XL will be adequate. A far more limiting factor is its 16K memory — and a package like Atariwriter will go a long way to help. If you want to use your computer for really serious word processing, you have to think in terms of a new machine — one with a minimum of 64K memory, and disk storage. The display is the least of your problems.

The 64 — a logical machine code route

Q I own a Commodore 64 and would like to get involved in machine code programming. I would be grateful if you could recommend a good 'idiot's guide'.

M Rand, Rayleigh, Essex.

A The short answer is no, 'cos machine code isn't for idiots. But neither is it restricted to hyper-intelligent lager drinkers. Making the switch from Basic to assembler can be a shock but being a 64 owner you're better placed than most because if you currently program in Basic, the chances are you're using close-to-machine-code anyway because all the PEEKs and POKEs required for sprites and sound are machine code in another form.

If you want to do it (it is worth the effort) you need at least two books. The first is *Programming the 6502* by Rodney Zaks. It looks daunting but really is essential because you should start, not by programming your 64, but by programming its processor, the 6510 (same as a 6502).

Once you know the instruction set and the different addressing modes, get hold of one of the multitude of titles dedicated to Commodore 64 machine code.

The choice is up to you, but look out for *Mastering Machine Code on your Commodore 64*, by Mark Greenshields (published by Interface), and *Machine Code Graphics & Sound*, by Peter Falconer (Melbourne House).

Be patient and work on it. Eventually you'll wonder how you managed without it — and your friends will hold you in high esteem.

Printers — Oric options

Q Can you tell me if there is a low-cost printer which is suitable for the Oric? I only require it for listings and simple printouts.

A The Oric printer seems too expensive.

Douglas Robertson, Glasgow.

A Hooking printers to your Oric is a simple process as the machine has a Centronics interface built in. For a standard dot-matrix printer try Seikosha (any serious compu-

ter store should be able to help); you could also look at some of the four-pen printer/plotters on the market for under £100. Cheapest of the lot, and more than adequate for listings, is, the range from Alpacom — from as little as £70. There isn't one specifically for Oric, but there is a Centronics version. Give Alpacom a ring on 0344-885661.

Ups and downs of machine code

Q I am learning machine code and I would like to move characters both vertically and horizontally on the screen. I have managed to move graphics smoothly from left to right but I am having trouble moving them up and down because of the way the screen is laid out.

A I would be very grateful if you could print a formula for printing on the screen.

Simon Trigg, Baldock, Herts.

A Since you don't say which machine you are using it is tricky to be of help (How long, Lord...)

But, undaunted, let us see how far we can get.

In machine code there are generally two ways to display characters on screen — memory maps and normal print routines. Which you use depends very much on the machines and the application. If you have managed side-to-side motion you're already more than halfway.

Our best guess is that you're using a screen location then INCrementing or DEC-rementing the required value for right and left movement respectively.

The trick with moving up and down in a similar fashion is that every micro uses a different mapping system — some have the lowest value in the top-left corner, others in bottom-left. Generally you'll find that top-left is the screen origin, in which case you need to add one line-length to the origin to move a character to the start of the second screen line, or subtract a line length for upwards

motion.

That's memory mapping. Generally, using ROM routines is easier where they are available. For example, on the Commodore 64 you can call a Kernel routine which will print a character at the position specified by the contents of two of the processor's registers.

Your best bet is to buy a book dedicated to machine code on your micro, or write to us again telling us what machine you're using.

After all, we're not telepaths, dammit.

Vic 20 upgrade — talking business

Q I have decided to buy a new computer but I need some advice. I presently own a Vic 20 so the obvious answer would be the 64, or possibly the Electron.

A I am particularly interested in speech synthesis and speech recognition.

T Dargie, Penarth, S Glamorgan.

A You don't say nearly enough about what you use your computer for, or how experienced you are. If you are programming in machine code, for instance, you'll probably want to stay with 6502 processors — and that rules out Spectrum, Amstrad and Memotech, for example.

The Electron is remarkably ill-equipped for expansion, so that must be a factor in your decision. On the question of speech synthesis, virtually all of the home computers — your Vic included — now have speech synthesizers available, so there's little to choose there.

Finally, speech recognition is fairly unbroken ground for personal computers but your minimum requirements will be analogue to digital conversion and pretty hefty memory. The BBC Micro scores well on the former, not so well on the latter. With the 64 the opposite is true. If you're serious about speech recognition you're facing some electronics and machine code — high level languages are much too slow.

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Oric sound gets fifth dimension

There's no reason why this short machine code routine for the Oric I shouldn't work on the Atmos; with a little modification, it could be adapted for the 16K Oric.

The routine creates a fifth sound effect, in addition to ZAP, PING, SHOOT, and EX-

```
10 DATA REM MEGA-ZAP
20 FOR T=0 TO 13
30 READ MC$:MC=VAL("#"+MC$)
40 POKE #9000+T,MC
50 NEXT T
60 DATA A9,0A,8D,07,03,20,
1B,F4,A9,27,8D,07,03,60
70 HIMEM=#9000
80 DOKE #2F5,#9000
90 NEW:END
```

Stringing along with a Spectrum screen

The Spectrum has a SCREEN\$(Y,X) function which is very useful in games. Unfortunately, it cannot normally detect user defined graphics characters.

The subroutine listed below overcomes this drawback but only works if the pointer to the

```
10 REM line 10
20 'Basic program revealer
30 MODE 2
40 address = 368
50 bytes = PEEK(address)
60 line.no = PEEK(address + 2)
70 PRINT address;line.no:
80 FOR count = 4 TO bytes - 2
90 conts = PEEK(address + count)
100 IF conts > 31 AND conts < 128 THEN P
PRINT CHR$(conts): ELSE PRINT conts:
110 NEXT
120 PRINT
130 address = address + bytes
140 GOTO 50
```

Save your QL variables

Not many people have noticed that the Sinclair QL does not save the variables when a Basic program is saved.

The short program top right enables variables to be saved

FLODE.

Once the program has been run, the routine is executed by entering 'I'(pling).

The machine code simply slows down the running speed by altering the contents of location 775. It then performs a JMP to #F41B, the ZAP routine, to produce a prolonged version of ZAP.

Philip Smart
Barnsley, Yorks.

```
2 DEFINE PROCEDURE datasave
3 DELETE mdv2_golf data
4 OPEN_NEW #9,mdv2 golf
5 PRINT#9,a
6 REMARK print#9.b and so on ...
7 CLOSE#9
8 END DEFINE
9 REMARK
10 REMARK
11 DEFINE PROCEDURE dataload
12 OPEN_IN #9,mdv2 golf_data
13 INPUT#9,a
14 REMARK input#9.b and so on ...
15 CLOSE#9
16 END DEFINE
```

Amstrad characters walk tall in any mode

Amstrad owners may find this double-height character routine useful. It can be used in any mode, and the mode number is held in the variable 'mo'.

The characters are PLOTTed onto the screen by the routine which starts at line 1000. The variables 'x' and 'y' should be

set to the pixel position, to start any message from and you can change the colours by altering the contents of the variable 'c'.

To get vertically striped characters, add 25 CALL &BA0A, and for horizontal stripes, REM out the second plot in line 1090. Other variations can be made by forcing 'y' values to even.

Philip Harling,
Southwater, W Sussex.

```
10 SYMBOL AFTER 32
20 FOR mo=0 TO 2:MODE mo
30 c=1:'Colour
40 x=20:y=199:Pixel position
50 m$="Double height in":GOSUB 1000
60 x=20:y=167:m$="Mode"+STR$(mo)
70 GOSUB 1000
80 FOR n=1 TO 2000:NEXT n:'Pause
90 NEXT mo
100 GOTO 20
110 '
1000 'Double height routine
1010 sp=4-mo*(mo+1):IF sp=2 THEN sp=1
1020 FOR n=1 TO LEN(m$)
1030 IF MID$(m$,n,1)<>" " THEN 1050
1040 y=y-32:GOTO 1140
1050 FOR t=0 TO 7
1060 p=PEEK(&A500+(ASC(MID$(m$,n,1))-32)*8+)
1070 r=256:FOR s=1 TO 8:r=r/2
1080 IF p-r < 0 THEN x=x+sp:GOTO 1110
1090 PLOT x,y,c:PLOT x,y-3,c
1100 p=p-r:x=x+sp
1110 NEXT
1120 y=y-4:x=x-8*sp
1130 NEXT
1140 y=y+32:x=x+8*sp
1150 IF x=639 THEN x=0:y=y-34
1160 NEXT
1170 RETURN
```

onto Microdrive two. The data-save procedure is used to save variables (just 'A' in this case) and dataload them back.

To save more variables, just add more lines eg B
6 PRINT#9,B
14 INPUT#9,B
Richard Sherford
Selsey, W Sussex.

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Software available to run on your **UPGRADE**d micro seems limitless. From wordprocessing to financial analysis for the professional user, to Pascal or Cobol for the serious programmer, all still capable of using the sound and graphics capabilities of the BBC micro. The choice does not end there though. An **UPGRADE** micro can be further expanded by adding up to three of our option boards to the unit. There are boards available for expanding the **UPGRADE**'s RAM, for providing further serial or parallel interfaces, additional disk interfaces for 5¼" or 8" disk drives. There is even a Winchester disk controller and an IEEE 488 interface option.

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Welcome to Output — the action-packed section of PCN where you'll find programs and projects, games, utilities and applications, useful routines, and helpful ideas. In short, plenty to keep your computer in action. We kick off with a spectacular adventure for the Spectrum. There are plenty of adventures around but we promise you haven't seen anything like this. Paul Braithwaite's imagination transports you to another time and place.

A long time ago, in a galaxy far, far away, people went about their business pretty much as they do on the planet Earth. In the sleepy little dormitory town of Wichester the young executives polished their cars and played squash while their children sniffed glue and vandalised phone booths — all the trappings of civilization were there, until the day they came.

The night was stormy, but not bad enough to arouse suspicions, and though the bright light over the mountains would normally have been puzzling, it was generally assumed this was just the arc lights from the ground of the local team, Wichester Athletic, playing at home that night.

But the people of Wichester awoke next morning to find their town had undergone a dramatic change. Initially some people blamed it on a power cut, but there were still nagging doubts. Power cuts don't normally leave a blackened hole in the wall where your shaver socket was, and they don't melt toasters and kettles.

As the commuters of Wichester stared at the smouldering ruins of their Ford Fiestas, they began to suspect that perhaps they faced something more than just an electrical failure.

The voice from the mountains, booming out over the town, confirmed this. All the inventions of the past two hundred years, it informed them, had been destroyed, and henceforth it would be forbidden to use electrical or mechanical equipment. Resistance was futile, and over the centuries the clean-cut unit families of Wichester degenerated into barbarism.

But finally the oppression of the Masters and the Tripods, a sort of robot police force, became too much and the people resolved to destroy their tormentors. Your mission, should you choose to accept it, is to find and destroy the Golden City, the home of the dominating Masters and Tripods. To do this you must find the balloon, fill it with gas, then use the ultimate weapon.

But take care on your quest — some of the people have been corrupted by the invaders, and will try to stop you, so trust no-one.

The game

The High Mountains runs on the 48K Sinclair Spectrum, and is an adventure for up to five players. Players can choose characters from two groups: the Masters and Tripods, of whom there are 16, and the people, of whom there are 14. The choice of character is important, as it determines the object of your quest, and your strength and manoeuvrability.



HIGH MOUNTAINS



Table 1: The main variables

Arrays:

- a\$() The character's names.
- b\$() The object names.
- a() The character's positions.
- c() The character's strength.
- d() The character's manoeuvrability.
- f() The object's position.
- g() The object's strength.
- i() Object 1 the characters can carry.
- j() Object 2 the characters can carry.
- p() The player's character's numbers.
- d\$() Break down of the latest command.

Letters:

- no Number of players.
- z Number of the character of the current player.
- q Player number of the current player.
- r Number of turns the current player has had.
- v\$ Location description.
- v,w,x,y Variables determining the directions the characters can move.
- c\$ Command.
- pos, Used to break down the command into separate words.
- begin

The quests are:

- The Masters and Tripods must attempt to destroy all the people not controlled by players.
- The people must compete in a quest to destroy the Golden City.

The program listings should be typed into the computer in the following sequence. First, Listing 1 should be typed in, and then run. This listing pokes the new character set into memory, then displays it on screen. If any of the characters look malformed the probable line in which the mistake was made can be determined by entering the defective letter. If the characters are completely wrong you must check all the data. Once the character set is satisfactory, enter OK and the program saves and verifies the data. You can then clear the program from memory and type in Listing 2.

Next, run the program and follow the on-screen instructions. These will ask for the data saved from Listing 1 to be loaded, and will then save the whole program, new characters as well.

Should you find you've mistyped a line in Listing 2 alter that line, and type GOTO 20.

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Table 2: program breakdown

- 10 The instructions.
- 140 Choosing the characters.
- 271 The Main program loop, consisting of:
 - 290-379 Prints where you are, the directions in which you can move and what you can see.
 - 380-389 Decides whether someone is attacking you.
 - 390-400 Your commands are entered.
 - 410-455 The commands are interpreted.
 - 460-606 The program jumps to the appropriate subroutine for the command.
 - 610-620 Routine explaining that your command was not understood.
 - 650-662 Decides whether a 'baddie' has won the game.
 - 670-680 Moves the objects the current player is carrying.

- 1200 Climb in routine.
- 1800 Ride in routine.
- 2400 Fight/kill routine.
- 3200 Examine routine.
- 3500 Look routine.
- 3800 Inventory routine.
- 4100 Get/take routine.
- 4700 Swim routine.
- 5000 Fill routine.
- 5600 Move north routine.
- 5700 Move south routine.
- 5800 Move east routine.
- 5900 Move west routine.
- 6600 Unlock routine.
- 6800 Save game routine.
- 6800 Load game routine.
- 7500 Data for locations (104 of them).
- 8700 Random attack routine.
- 8800 Win routine for 'goodies'.
- 8900 Random movement of characters.
- 9000 Variable initiation routine.

Listing 1

```

10 CLEAR 43999: PRINT AT 5,81"WAIT WHILE
THE NEW CHARACTER SETS POKED INTO MEMORY"
20 FOR J=10616 TO 16304
30 POKE J+40304,PEEK J
40 NEXT J
45 RESTORE 1000
50 FOR J=64000 TO 64023: GO SUB 800: NEXT J
60 FOR J=64200 TO 64215: GO SUB 800: NEXT J
70 FOR J=64240 TO 64255: GO SUB 800: NEXT J
80 FOR J=64264 TO 64471: GO SUB 800: NEXT J
120 POKE 23686,01: POKE 23687,249
130 PRINT "#####7ABCDEFHIJKLMNOPQRSTUVWXYZ
140 POKE 23687,60: PRINT "Do any of these
characters look wrong? If so input the ch
racter,else input '0'."
150 INPUT "COMMAND ">A$

```

```

160 IF A$="" THEN GO TO 550
170 IF A$="*" OR A$="?" OR A$="!" THEN PR
INT "CHECK LINE 1000 TO 1020": STOP
180 IF A$="0" THEN GO TO 550
190 IF A$="0" OR A$="2" THEN GO TO 150
200 PRINT "CHECK LINE 11000+80: STOP
210 PRINT "INSERT A BLANK CASSETTE WITH
AT LEAST 5 MIN BLANK SPACE ON . THEN RE
WIND TAPE ."
210 SAVE "CHR">CODE 64000,760
520 PRINT "NOW REWIND THE TAPE, AND PRESS
PLAY TO VERIFY THE DATA.": VERIFY "CHR">
CODE 64000,760
530 CLS: PRINT "OK,NOW THE PROGRAM WILL
CLEAR ITSELF FROM MEMORY READY FOR YOU
TO TYPE IN LISTING 2."
540 PRINT FLASH 11 INK 11"PRESS ANY KEY T
O CLEAR PROGRAM."
550 IF INKEY="" THEN GO TO 550
560 NEW
580 READ A1:POKE J,0: RETURN
1000 DATA 16,56,56,56,16,16,8
1010 DATA 0,100,100,72,0,0,0
1020 DATA 0,0,24,0,0,24,0,0
1030 DATA 0,0,0,120,102,120,60,40
1040 DATA 0,24,52,102,120,60,36,110
1050 DATA 0,124,120,102,124,102,120,92
1060 DATA 0,24,60,102,96,102,60,24
1070 DATA 0,120,124,102,102,102,124,80
1080 DATA 0,20,62,112,120,112,62,20
1090 DATA 0,14,62,112,112,112,64,60
1100 DATA 0,20,62,102,96,110,124,60
1110 DATA 0,124,120,102,120,120,102,110
1120 DATA 0,62,62,24,24,24,62,120
1130 DATA 0,30,30,6,6,70,124,50
1140 DATA 0,102,110,124,120,100,102,114
1150 DATA 0,40,40,40,90,90,120,60
1160 DATA 0,230,254,254,214,210,190,102
1170 DATA 0,70,110,120,120,110,102,50
1180 DATA 0,102,24,60,102,102,102,50
1190 DATA 0,60,120,102,120,96,102,60
1200 DATA 0,24,60,102,102,100,62,60
1210 DATA 0,92,120,102,102,102,70,102
1220 DATA 0,60,102,96,60,6,102,60
1230 DATA 0,174,90,24,24,24,24,20
1240 DATA 0,100,64,100,100,100,120,62
1250 DATA 0,30,30,102,102,110,60,40
1260 DATA 0,190,190,190,212,124,124,40
1270 DATA 0,102,124,60,24,60,102,110
1280 DATA 0,6,102,124,56,40,40,56
1290 DATA 0,126,94,20,56,112,126,114

```

Listing 2

```

10 PRINT "LOAD THE DATA SAVED BY LISTING
1": LOAD "CHR">CODE 64000,760
20 PRINT "NOW REWIND THE TAPE TO SAVE T
HE FINISHED PROGRAM."
30 SAVE "HIGH HTS" LINE 80: SAVE "CHR">
CODE 64000,760
40 GO TO 80
80 CLS: PRINT FLASH 11 PAPER 11 INK 61A
T 10,51" LEAVE TAPE RUNNING "1 INK 7: PAPE
R 7
90 POKE 23686,01: POKE 23687,249: POKE 23
688,01: POKE 23689,100: BORDER 01: PAPER 01
INK 7
100 BORDER 01: PAPER 01: INK 6
110 CLS: PRINT 2,96"HIGH MOUNTAIN S
111 INK 7
120 PRINT "IF YOU ARE EITHER A MASTER O
R A RPIID THEN THE OBJECT OF YOUR GAME IS
TO DESTROY ALL THE OTHER CHARACTERS WHO AR
E NOT BEING CONTROLLED BY OTHER PLAYERS"
130 PRINT "IF YOU ARE NOT A MASTER OR A
TRIPID THEN YOU MUST COLLECT THE APPROPRI
ATE OBJECTS AND CARRY OUT THE TASKS TO
ENABLE YOU TO DESTROY THE SOLIDEN CITY."
132 PRINT "WHEN YOU THINK YOU HAVE THE
REQUIRED OBJECTS IN YOUR CORRECT
FORM, RETURN TO THE GOLDEN CITY AND PI
RE AWAY."
133 GO SUB 9900: PRINT FLASH 11 PAPER 61
INK 11" PRESS ANY KEY TO BEGIN"
134 IF INKEY="" THEN GO TO 134
135 CLS: PRINT INK 61AT 2,01"THE HIGH NO
UNTAINS"
136 PRINT "COMMANDS ARE ':'','CLINE':'>R
IDE > DIRECTION':'>KILL >':'>F10
137 PRINT "EXAMINE ':'>LOOK':'>INVENTORY
':'>GET':'>TAKE':'>SWIM':'>FILL >':'>
UI >':'>DROP':'>UNLOCK':'>FREE':'>I
DAD':'>SAVE':'>ID > DIRECTION TO MOVE."
139 PRINT FLASH 11 PAPER 61 INK 11" PR
ESS ANY KEY TO BEGIN"
139 IF INKEY="" THEN GO TO 139
140 INK 4
150 CLS: PRINT AT 2,61"THE CHARACTERS":
INK 01: PRINT
160 FOR J=1 TO 29 STEP 2: PRINT A1J1TAB
20A A1J1: NEXT J
170 INPUT "THE NUMBER OF PLAYERS IS "100
180 IF 0<=I OR 0>=I THEN GO TO 170
190 FOR J=1 TO 0+1
200 INPUT "PLAYER {J}:">I1J1"1"
202 IF J<=I THEN GO TO 250
210 FOR J=1 TO J-1: IF A1J1<=A1(J+1) T
HEN GO TO 200
220 NEXT J
230 FOR J=1 TO 30: IF 0<=J THEN 0+1=0+1:
0+1=0+1: THEN LET P1(J)=0: GO TO 270
240 NEXT J
250 CLS: PRINT 20A 200
270 NEXT J

```

```

270 CLS
280 FOR 0+1 TO 0+1: LET P1(0+1)=0: DIM 0+1,2
0+1: LET 0+1="L000"
281 FOR J=1 TO 0+1: IF C1(J)="" THEN GO T
O 283
283 NEXT J: PRINT FLASH 11 PAPER 11 INK 6
1: EN
D OF GAME , NO-ONE HAS WON THE
GAME
1 FOR 0+1 TO 101: REEP ,3,0: NEXT 0+1:
O TO 100
280 IF C1(0+1)="" THEN NEXT 0+1: GO TO 280
284 PRINT 1: PRINT FLASH 11 BRIGHT 11 PAPER
7: INK 11"*****DIFFERENT PLAYER'S TURN#
0": PRINT
285 FOR 0+1 TO 0+1
286 IF C1(0+1)="" THEN NEXT 0+1: GO TO 280
287 LET 0+1=INT (RND(50)*1): FOR 0+1 TO 0+1
: IF 0+1=0 THEN GO TO 288
288 NEXT 0+1 TO 500 0+100
290 PRINT PAPER 11 INK 4"*****
*****
*****
*****
*****
290 IF 0+1 TO 21="NO" OR 0+1 TO 21="
NO" OR 0+1 TO 21="EA" OR 0+1 TO 21="
WE" OR 0+1="SUIM" OR 0+1="RIDE
" OR 0+1="CLINE" OR 0+1="KNT
" OR 0+1="LOOK"
295
296 GO TO 300
300 FOR 0+1 TO C1(0)
310 REM TELLS YOU WHERE YOU ARE
320 RESTORE (100+0+1*7400): READ V0,V1
330 PAPER 61 INK 2: PRINT V0
340 IF A1(0+1)="" OR 0+1=0 THEN PRINT "
HE SHED IS LOCKED"
342 IF A1(0+1)="" OR 0+1=0 THEN PRINT "
HE SHED IS NOT LOCKED"
343 RESTORE 910: FOR J=1 TO 10: READ M0
: IF M0=1 AND 0+1=0 THEN PRINT "THE CANAL
IS IN YOUR EAST"
345 IF M0=1 AND 0+1=0 THEN PRINT "THE CAN
AL IS TO YOUR WEST"
346 NEXT J
348 PRINT "YOU CAN MOVE EITHER
350 IF V=1 THEN PRINT "SOUTH"
352 IF V=1 THEN PRINT "NORTH"
354 IF V=1 THEN PRINT "EAST"
356 IF V=1 THEN PRINT "WEST"
360 POKE 23687,255
370 FOR J=1 TO 15
371 IF C1(J)="" THEN GO TO 372
372 GO TO 376
373 FOR J=1 TO 30: IF I1(J) OR J1(J) TH
EN GO TO 376
374 IF J=7 AND 0+1=0 THEN NEXT J
375 NEXT J: PRINT "YOU CAN SEE : "100J
11"
376 NEXT J
377 LET 0+1
378 FOR 0+1 TO 30: IF A1(0+1) AND C1(0)
THEN LET 0+1=INT "YOU CAN SEE : "1A
0+1"
379 NEXT J
380 LET I1=INT (RND(10+0+1)): IF I1<=1
THEN GO SUB 9700
390 PAPER 61 INK 7: PRINT "WHAT DO YOU
WANT TO DO NOW "1A(0+1) 7": INK 4
400 INPUT "COMMAND ">I1C1
410 PRINT PAPER 7: INK 61C
420 DIM 0+1,10
430 LET 0+1=1: LET 0+1=1: LET 0+1=1: LET 0+1=1
440 IF C1(0+1)="" THEN LET 0+1=0+1: LET 0+1=0+1
450 NEXT J
455 LET 0+1=0+1: LET 0+1=0+1: LET 0+1=0+1
460 IF A1(0+1)="" OR 0+1=0 THEN GO TO 1000
462 IF A1(0+1)="" OR 0+1=0 THEN GO TO 2400
500 IF 0+1="F10HT" THEN GO TO 2400
510 IF 0+1="EXARINE" THEN GO TO 3200
520 IF 0+1="RIDE" THEN GO TO 3500
530 IF 0+1 TO 21="IN" THEN GO TO 3000
540 IF 0+1="DET" THEN GO TO 4100
550 IF 0+1="TAGE" THEN GO TO 4100
570 IF 0+1="SUIM" THEN GO TO 4700
580 IF 0+1="FILL" THEN GO TO 5000
590 IF 0+1="DROP" THEN GO TO 5200
599 IF 0+1="LOAD" THEN GO TO 6040
600 IF 0+1="SAVE" THEN GO TO 6000
601 IF 0+1 TO 21="NO" THEN GO TO 5600
602 IF 0+1 TO 21="0" THEN GO TO 5700
603 IF 0+1 TO 21="EA" THEN GO TO 5800
604 IF 0+1 TO 21="WE" THEN GO TO 5900
605 IF 0+1="UNLOCK" THEN GO TO 6400
606 IF 0+1 TO 41="F10" THEN GO TO 800 0
610 PRINT "I DO NOT UNDERSTAND YOU !!"
620 GO TO 300
630 IF 0+1 TO 21="NO" THEN GO TO 5600
650 IF J=0+1 THEN GO TO 640
652 NEXT J
655 IF 0+1=0 THEN GO TO 670
660 NEXT J
662 IF C1(0) THEN PRINT PAPER 11 INK 61: FL
ASH 11
665 IF 0+1 TO 101: REEP ,3,0: NEXT 0+1
PAU
SE 100: GO TO 100
670 IF I1(0) THEN LET I1(1)=0+1
680 IF I1(0) THEN LET I1(1)=0+1
770 NEXT J: NEXT 0+1: GO TO 280

```


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```

7938 DATA "YOU CAN SEE THE RAILWAY PASSING
HEAR TO THE FOREST" HERE.,1,1,1,1
7940 DATA "THERE IS AN OLD DEEP PIT HERE.",
1,1,0,1
7946 DATA "YOU CAN SEE A LARGE TRIPPO FOOT
PRINT HERE",1,1,1,0,1
7948 DATA "YOU CAN SEE A FIELD OF GOATS
HERE",1,1,1,0,1
7952 DATA "THERE IS A WALL HERE WITH WINES
GROWING ALL OVER IT",0,1,0,1,1
7954 DATA "YOU CAN JUST SEE THE VILLAGE
HERE",1,1,1,1,0
7958 DATA "THERE IS A LARGE FIELD HERE",0,
1,1,1
8004 DATA "THERE IS A LARGE FIELD HERE",0,
1,1,1
8006 DATA "YOU ARE AT THE ENTRANCE TO A
CAVE",1,1,0,1
8022 DATA "YOU ARE SOUTH OF THE LARGE
CLIFFS",1,1,1,0,1
8024 DATA "YOU CAN SEE THE LARGE CLIFFS BUT
ARE IN OPEN SPACE",0,1,1,1
8040 DATA "YOU CAN SEE REMAINS OF A TALL
PYLON",0,1,1,1
8054 DATA "YOU CAN SEE A LARGE SIGN SAYING
'HIGH WATERS'",0,1,1,1
8074 DATA "YOU ARE ON A PLAT PLAIN NEXT TO
THE CANAL",1,1,0,1
8080 DATA "YOU CAN SEE HOOF MARKS",1,1,0,0
8082 DATA "YOU ARE ON A BLEAK NOOD",1,1,1,1
8102 DATA "THERE IS A SHARP DROP TO THE
SOUTH OF THE BAREN ROCK ON WHICH YOU STAND",
1,1,0,1,1
8110 DATA "YOU ARE STANDING ON A WELL
TROTTERED PATH",1,0,1,1
8126 DATA "YOU CAN SEE MOUNTAINS GLISTENIN
G IN THEIR FILL COLOR",1,1,0,1
8132 DATA "YOU ARE IN THE REMAINS OF A
GREAT CITY",1,1,1,1
8140 DATA "YOU ARE SURROUNDED BY HIGH
MOUNTAINS",1,1,0,1
8146 DATA "YOU ARE STANDING ON A WHITE
ROTTED LINE",1,1,1,0
8148 DATA "THERE IS AN OLD WARE HOUSE HERE",
1,1,1,1,1
8148 DATA "THERE IS AN OLD WARE HOUSE HERE",
1,1,1,1,1
8178 DATA "A DRY RIVER PASSES THROUGH HERE",
1,1,1,1,1
8182 DATA "THERE ARE REMAINS OF A BRIDGE
HERE",1,1,1,1,1
8192 DATA "THERE IS THE REMAINS OF AN OLD
STATION HERE",1,0,1,1
8202 DATA "YOU CAN SEE THE CANAL GLISTENIN
G IN THE SUN",1,1,1,1,1
8212 DATA "YOU ARE AT A PUB ALONG SIDE THE
CANAL",1,1,1,1,1
8222 DATA "THERE IS THE REMAINS OF A LARGE
BOAT HERE",1,1,1,1,1
8232 DATA "THERE IS THE REMAINS OF A TRIPPO
DOME",0,1,1,1
8242 DATA "THERE IS THE REMAINS OF A DEAD
SHEEP HERE",0,1,1,1
8250 DATA "YOU CAN SEE A LARGE MAN MADE
TUNNEL",0,0,1,1
8262 DATA "YOU ARE IN A SMALL GREEN VALLEY",
1,1,1,1,1
8272 DATA "YOU CAN SEE SOME GLOWING LIGHT
BULBS IN AN OLD SHED AND WONDER WHAT POWER
IS THERE",1,1,0,1,1
8282 DATA "THE LAND IS FLAT AND BEAR HERE",
1,1,1,1,1
8292 DATA "YOU'RE IN A CITY OF THE ANCIENT
S",1,0,1,1
8302 DATA "THERE ARE LARGE BUILDINGS ALL
AROUND",1,1,0,1
8312 DATA "MANY LONG CARRIAGES ARE AROUND
YOU",1,1,1,0,1
8322 DATA "THE CITY OF THE ANCIENTS LOOKS
DARK AND WONDERFUL",0,0,0,1,1
8332 DATA "YOU ARE IN A SMALL MEADOW BY THE
CANAL",1,1,1,0,1
8342 DATA "YOU CAN HEAR THE CANAL HORSES
E",1,1,1,0,1
8352 DATA "YOU ARE ON AN OLD TRACK",1,1,1,1,
0,1
8362 DATA "THE OLD TRACK YOU STAND ON DIPS
A LITTLE",1,1,1,1,1
8372 DATA "YOU'RE IN A VILLAGE BY THE
MOUNTAINS",1,1,1,1,1
8382 DATA "YOU ARE ON TOP OF A LARGE
MOUNTAIN AND CAN SEE A SMALL LIGHT TO
THE ENE",0,1,1,1,1
8402 DATA "THE MOUNTAINS ARE NOT SO TALL
HERE",1,1,1,1,1
8412 DATA "YOU ARE IN A LARGE FLAT VALLEY",
1,1,1,1,1
8414 DATA "THERE IS A TALL CHIMNEY HERE",1,
0,1,1,0
8424 DATA "YOU ARE IN A LARGE FACTORY",0,0,
0,1,1
8434 DATA "TALL SKYSCRAPERS SURROUND YOU",
1,1,0,1,1
8442 DATA "YOU CAN SEE LARGE WHITE
BUILDINGS",1,1,0,1,1
8454 DATA "YOU HAVE SUDDENLY CAN INTO
DARKNESS",0,0,0,1,1
8464 DATA "YOU ARE ON A WEIRD FAT METALLIC
CSURFACE",1,1,0,0,1
8474 DATA "THE CANEL IS NEXT TO YOU",1,1,0,
1,1
8482 DATA "YOU CAN SEE THE SEAM ON A LARG
ERDOR",1,1,0,0,1
8492 DATA "THERE IS A STONE WALL HERE",1,1,
0,1,1
8502 DATA "THE AIR IS THIN AND YOU CANNOT
SEE MUCH IN THE FOG",1,0,1,1

```

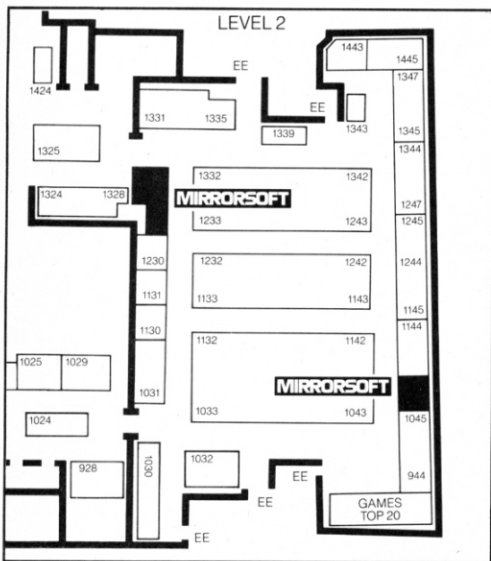
```

8512 DATA "THE HIGH MOUNTAINS AROUND YOU
ARE DAMP",1,1,0,1,1
8522 DATA "IT IS RAINING HARD AND THE FOG
MEANS YOU CAN SEE VERY LITTLE",1,0,1,1,1
8532 DATA "THE AIR IS THIN AND YOU CANNOT
SEE MUCH IN THE FOG",1,0,1,1
8542 DATA "THE HIGH MOUNTAINS AROUND YOU
ARE DAMP",1,1,0,1,1
8552 DATA "IT IS RAINING HARD AND THE FOG
MEANS YOU CAN SEE VERY LITTLE",1,0,1,1
8562 DATA "THE PATH IS UNSURRABLE AS YOU
BATTLE TO DEFEAT THE TRIPPODS.",1,0,0,1
8570 REM #ANDOR 1111
8701 INK 3: PAPER 0
8702 FOR I=1 TO 17 STEP -11 IF #I(1)=11
8703 AND #I(2) THEN GO TO 8718
8704 NEXT I
8705 FOR J=1 TO 17: IF #I(2)=#I(1) AND #I(2)
AND #I(1) THEN GO TO 8718
8706 NEXT J: RETURN
8718 FOR I=1 TO 38: IF #I(2)=#I(1) AND #I(2)
THEN GO TO 8728
8719 NEXT I: RETURN
8728 FOR I=1 TO 10: IF #I(1)=1 THEN RETURN
8729 NEXT I
8732 PRINT "YOU ARE BEING ATTACKED BY
'1A81J)"
8741 LET #I=INT (RND#0+1)
8742 IF #I(1)+#I(2)=5 THEN GO TO 8748
8743 LET #I(1)=2: #I(2)=4: PRINT "YOU WERE BADL
Y INJURED."
8744 IF #I(2)=#I(1) THEN PRINT "INFACT YOU HAVE
EEN KILLED." : LET #I(1)=999: GO TO 8748
8745 IF #I(1)=5 THEN GO TO 8752
8746 IF #I(1)+#I(2)=5 THEN GO TO 8752
8747 LET #I(1)=3: #I(2)=4: PRINT #I(1) "IS BA
DLY INJURED."
8748 IF #I(1)=3 THEN PRINT "INFACT '1A81J)"
IS BEING KILLED." : LET #I(1)=999: GO TO 87
52
8749 GO TO 8752
8752 IF #I(1)=2 THEN PRINT "YOU WERE BADL
Y INJURED." : LET #I(1)=2: #I(2)=1: GO TO 87
58
8753 IF #I(1)=3 THEN PRINT "INFACT #I(1) IS
BEING KILLED." : LET #I(1)=3: #I(2)=1: GO TO 87
58
8754 IF #I(1)=4 THEN PRINT "INFACT '1A81J)"
IS BEING KILLED." : LET #I(1)=4: #I(2)=1: GO TO 87
58
8755 IF #I(1)=5 THEN PRINT "INFACT #I(1) IS
BEING KILLED." : LET #I(1)=5: #I(2)=1: GO TO 87
58
8756 IF #I(1)=6 THEN PRINT "INFACT '1A81J)"
IS BEING KILLED." : LET #I(1)=6: #I(2)=1: GO TO 87
58
8757 IF #I(1)=7 THEN PRINT "INFACT #I(1) IS
BEING KILLED." : LET #I(1)=7: #I(2)=1: GO TO 87
58
8758 IF #I(1)=8 THEN PRINT "INFACT #I(1) IS
BEING KILLED." : LET #I(1)=8: #I(2)=1: GO TO 87
58
8759 IF #I(1)=9 THEN PRINT "INFACT #I(1) IS
BEING KILLED." : LET #I(1)=9: #I(2)=1: GO TO 87
58
8760 IF #I(1)=10 THEN PRINT "INFACT #I(1) IS
BEING KILLED." : LET #I(1)=10: #I(2)=1: GO TO 87
58
8761 PRINT PAPER 2: INK 7: #I(1)=11: DO YOU
WANT TO DROP ALL YOU ITEMS AND CONCEED ?"
8762 FOR I=1 TO 37: 37:55
8763 INPUT "COMMAND :";#I
8764 IF #I="W" OR #I="Y" THEN GO TO 2000
8765 REM #I
8802 IF #I(1)=2 THEN PRINT "YOU CANNOT FI
RE HERE TO WIN THE GAME." : GO TO 430
8804 IF #I(2)=#I(1) OR #I(2)=#I(1) THEN PRINT "YOU D
O NOT HAVE THE RIGHT THING TO FIRE WITH:"
GO TO 430
8812 IF #I(1) AND #I(2)=3 THEN PRINT FLASH
" : PAPER 1: #I(1)=#I(2)
H
AS WON THE GAME.
? FOR I=1 TO 10: BEEP 3,4:
NEXT I: PAUSE 100: GO TO 100
8822 IF #I(1) AND #I(2)=4 THEN PRINT FLASH
" : PAPER 1: #I(1)=#I(2)
H
AS WON THE GAME.
? FOR I=1 TO 10: BEEP 3,4:
NEXT I: PAUSE 100: GO TO 100
8832 PRINT "YOU DO NOT HAVE THE RIGHT THING
ON TO FIRE WITH." : GO TO 430
8900 REM #ANDOR MOVE
8910 RESTORE #I(1)+#I(2)+7490: READ #I(1),#I(2)
8920 LET #I(1)=INT (RND#0+1)
8925 IF #I(1)=#I(2) AND #I(1) THEN LET #I(1)=#I(2)+1
8930 IF #I(1)=2 AND #I(1) THEN LET #I(1)=#I(2)+1
8935 IF #I(1)=3 AND #I(1) THEN LET #I(1)=#I(2)+1
8940 IF #I(1)=4 AND #I(1) THEN LET #I(1)=#I(2)+1
8945 RETURN
9000 REM THE VARIABLE
9010 DIR #I(10,10): DIR #I(20): DIR #I(30):
DIR #I(40): DIR #I(50,10): DIR #I(60): DIR #I(70)
(10)
9011 DIR #I(10,10): DIR #I(20): DIR #I(30):
DIR #I(40)
9012 DIR #I(30,30): LET #I(10)=#I(20)
9020 LET #I(1)=#I(20)
9030 LET #I(2)=#I(20)
9040 LET #I(3)=#I(20)
9050 LET #I(4)=#I(20)
9060 LET #I(5)=#I(20)
9070 LET #I(6)=#I(20)
9080 LET #I(7)=#I(20)
9090 LET #I(8)=#I(20)
9100 LET #I(9)=#I(20)
9110 LET #I(10)=#I(20)
9120 LET #I(11)=#I(20)
9130 LET #I(12)=#I(20)
9140 LET #I(13)=#I(20)
9150 LET #I(14)=#I(20)
9160 LET #I(15)=#I(20)
9170 LET #I(16)=#I(20)
9180 LET #I(17)=#I(20)
9190 LET #I(18)=#I(20)
9200 LET #I(19)=#I(20)
9210 LET #I(20)=#I(20)
9220 LET #I(21)=#I(20)
9230 LET #I(22)=#I(20)
9240 LET #I(23)=#I(20)
9250 LET #I(24)=#I(20)
9260 LET #I(25)=#I(20)
9270 LET #I(26)=#I(20)
9280 LET #I(27)=#I(20)
9290 LET #I(28)=#I(20)
9300 LET #I(29)=#I(20)
9310 LET #I(30)=#I(20)
9320 LET #I(31)=#I(20)
9330 LET #I(32)=#I(20)
9340 LET #I(33)=#I(20)
9350 LET #I(34)=#I(20)
9360 LET #I(35)=#I(20)
9370 LET #I(36)=#I(20)
9380 LET #I(37)=#I(20)
9390 LET #I(38)=#I(20)
9400 LET #I(39)=#I(20)
9410 LET #I(40)=#I(20)
9420 LET #I(41)=#I(20)
9430 LET #I(42)=#I(20)
9440 LET #I(43)=#I(20)
9450 LET #I(44)=#I(20)
9460 LET #I(45)=#I(20)
9470 LET #I(46)=#I(20)
9480 LET #I(47)=#I(20)
9490 LET #I(48)=#I(20)
9500 LET #I(49)=#I(20)
9510 LET #I(50)=#I(20)
9520 LET #I(51)=#I(20)
9530 LET #I(52)=#I(20)
9540 LET #I(53)=#I(20)
9550 LET #I(54)=#I(20)
9560 LET #I(55)=#I(20)
9570 LET #I(56)=#I(20)
9580 LET #I(57)=#I(20)
9590 LET #I(58)=#I(20)
9600 LET #I(59)=#I(20)
9610 LET #I(60)=#I(20)
9620 LET #I(61)=#I(20)
9630 LET #I(62)=#I(20)
9640 LET #I(63)=#I(20)
9650 LET #I(64)=#I(20)
9660 LET #I(65)=#I(20)
9670 LET #I(66)=#I(20)
9680 LET #I(67)=#I(20)
9690 LET #I(68)=#I(20)
9700 LET #I(69)=#I(20)
9710 LET #I(70)=#I(20)
9720 LET #I(71)=#I(20)
9730 LET #I(72)=#I(20)
9740 LET #I(73)=#I(20)
9750 LET #I(74)=#I(20)
9760 LET #I(75)=#I(20)
9770 LET #I(76)=#I(20)
9780 LET #I(77)=#I(20)
9790 LET #I(78)=#I(20)
9800 LET #I(79)=#I(20)
9810 LET #I(80)=#I(20)
9820 LET #I(81)=#I(20)
9830 LET #I(82)=#I(20)
9840 LET #I(83)=#I(20)
9850 LET #I(84)=#I(20)
9860 LET #I(85)=#I(20)
9870 LET #I(86)=#I(20)
9880 LET #I(87)=#I(20)
9890 LET #I(88)=#I(20)
9900 LET #I(89)=#I(20)
9910 LET #I(90)=#I(20)
9920 LET #I(91)=#I(20)
9930 LET #I(92)=#I(20)
9940 LET #I(93)=#I(20)
9950 LET #I(94)=#I(20)
9960 LET #I(95)=#I(20)
9970 LET #I(96)=#I(20)
9980 LET #I(97)=#I(20)
9990 LET #I(98)=#I(20)
10000 LET #I(99)=#I(20)

```



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DRIVE DOKTOR

Make sense of the BBC disk
operating system with
Kenn Garroch's program

Disk operating systems are usually meant to be transparent to the user but, unfortunately, there are times when it is helpful, if not vital, that the disk be accessed directly.

The BBC's DFS and OS allow this direct reading to be done through the OSWORD (&FFF1) &7F call. But this is complicated to do directly from the keyboard. Fortunately, the BBC's Basic procedures and functions come to our aid. The following program is based around PROCROWDISK(T,S,RW) which allows a section of the disk to be read or written for inspection and alteration.

On running the program, the main menu is displayed. From here a number of options are available. If, at any time, you want to return to this menu, just use Escape. The only exits from the program are option '0' and Break. Selecting option '1' allows any sector of the disk to be read and displayed on the screen.

The format of the display resembles that used with "DUMP" except that the left hand column of figures display the track, sector, and position in the sector. Due to limitations in the screen size, only one half of the sector can be displayed at any one time—the first 128 bytes, or the second.

Option '2' allows the contents of the disk to be directly altered. PROCEDIT provides two methods to perform this: first altering the HEX numbers, and secondly the ASCII characters these numbers represent. Once the sector is displayed the editing cursor can be moved around the screen with the cursor keys.

To make any changes simply retype the data you want. To finish editing, press the CTRL and @ keys simultaneously. You are then asked which section you want to write to the disk—the numbers or ASCII. Which one you select depends on which section of the screen you changed.

After this, the program will read the screen and ask you if you want to write to the disk. Pressing 'Y' causes the program to ask if you are positive. All this palaver is necessary to make sure that crazy disasters are not too easily perpetrated.

Another option on the main menu is '3', run disassembler. This runs an external disassembler program. If you have one of your own, it can be hooked into the program with PROCDISS at

line 1430. The catalogue option simply performs a '*' to display the current directory of the disk. Similarly, Information does "INFO*" to display the load, storage, execution, and length information on each file.

The final menu option reads the disk sector by sector starting at 00. This can be useful if you need to do a visual search for a particular piece of data. It does, however, take some time.

To use the program, it helps if the layout of the disk is known. This is all based around the directory, track 0, sectors 0 and 1.

Using the read option and selecting track zero, sector zero, low, gives us our first look at the directory. The first eight bytes contain the first eight characters in the title (set by "TITLE"). Following this, each file on the disk is assigned seven bytes for its name and one for its directory. If you then press 'M' you will be able to reset the track, sector, and section.

Entering 0<CR>, 0<CR>, H<CR>, reveals the high part of the sector. The contents of this are similar to those of the lower half except that there's no title included. A quick calculation reveals why Acorn DFS disks are limited to a maximum of 31 files. A sector contains 256 bytes, each file name needs eight bytes and the title needs eight (on the first sector)—hence $31 \times 8 = 248$ plus 8, and the sector is full.

Hitting 'M' again and selecting 0, 1, L displays the first part of sector one track zero. The first four bytes are the rest of the 12 character disk title. The next byte is the number of times the disk has been written to and the one following this is the number of files on the disk times eight.

The last two bytes contain the number of tracks on the disk times 100 and the current "OPT 4 selection. So, for a 40 track disk that has been "OPT 4, 3, d, these will read 31 90 since $\times 190 = 400$ and the option is 3.

To make sense of the rest of the data given it helps to notice that it's in a pattern that recurs every eight bytes. If you press Escape and hit option 5, you will see where the pattern comes from. It is the load, execution, length, and disk position for each disk file. The numbers are stored in low byte, high byte format for ease of use by the 6502 eg 00 19 is &1900 (6400 decimal).

The first two bytes are the load address for the file. For most Basic files, this will be 00 19 since this is the normal setting of PAGE when a program is saved. For machine code files, this would be the address specified in the "SAVE

command as the start location. For data files, this is normally 00 00.

The next two bytes contain the execution address. For Basic programs, this is 1F 80 but for Basic II it has been changed to 23 80. It does not normally matter which of these is used since the operating system seems to be able to work out the correct address.

(NB to find out which Basic you have press Break and type REPORT <CR>.)

For machine code files these two locations contain the execution address for that particular program, as specified in "SAVE SSSS+LLLL EEEE and are used with "RUN. Again, data files will normally have these two bytes set to zero.

The third pair of bytes is the length of the file and is the same format for all file types.

The final pair contains the position of the file on the disk and whether the file is a Basic program. The position is specified as an absolute number of sectors from the beginning, track 0 sector 0, to track 39 (79) sector 9. Since each track has ten sectors, dividing the position number by ten tells you which track it is on.

The position bytes are unusual because they are the right way round. A position of &15E is placed on the disk as 01 5E and not 5E 01. If the file is a Basic program, the system adds CC to the high byte of the position. So a Basic file residing at &113 is placed in the directory as CD 13.

Stating the obvious, there are only 31 sets of eight bytes in sector 1, that relate to the files. These are in the same file order as sector 0, so relating them is easy.

The files on the Acorn format disks are placed one after the other continuously. This has both an advantage and a disadvantage. The disadvantage is that disk space is used inefficiently and 'can't extend' errors can quite frequently occur. The advantage is that once you have found the start of a file it is simply a matter of stepping through the sectors to find the rest of it. This means recovering a file from an uncompact disk is fairly straightforward. Even adding a file is simple.

The only things that need to be altered are the number of files on the disk, a new name and set of information.

Additional notes

Most of the procedures and functions used in this program can be used for other things besides reading the disk. FNHX, FNCHAR, and PROC DUMP are good

examples. They may need to be altered slightly but the basic algorithms are complete.

For users with more than one disk drive, the parameter block used in PROCRWDISK must be altered. The first byte contains the drive number to be written or read. Altering line 740 to ?PARAM=1 accesses drive 1. Multi-drive users may like to include drive selection on the main menu.

If PROCRWDISK is unable to read the disk for any reason, the Beeb beeps and the program continues with a RW error. If this happens try again or admit that the disk has an unrecoverable error. ▀

```

100NERRORPROCMENU
20DIM BLK 255
30DIM PARA 10
40TR=0
50SE=0
60HL=0
70PROCMENU
80DEFFPROCMENU
90CLS
100PRINT
110PRINT"
120PRINT"(C) KENNSOFT 1983"
130PRINT TAB(5,6):"0...END"
140PRINT TAB(5,8):"1...READ DISK"
150PRINT TAB(5,10):"2...EDIT DISK"
160PRINT TAB(5,12):"3...RUN DISSASSEMBL
ER"
170PRINT TAB(5,14):"4...CATALOG"
180PRINT TAB(5,16):"5...INFORMATION"
190PRINT TAB(5,18):"6...SEE DISK"
200A$=GET$
210IF A$="0" THEN END
220IF A$="1" THEN PROCREAD
230IF A$="2" THEN PROCEDIT
240IF A$="3" THEN PROCDISS
250IF A$="4" THEN PROCCAT
260IF A$="5" THEN PROCCINFO
270IF A$="6" THEN PROCCDISK
280GOTO 90
290ENDPROC
300DEFFPROCGBTS
310LOCAL TR$, HL$, SE$
320INPUTTAB(0,20)"TRACK " TR$
330INPUTTAB(0,21)"SECTOR " SE$
340INPUTTAB(0,22)"Hi or Low " HL$
350TR=VAL(TR$)
360SE=VAL(SE$)
370IF HL$="H" THEN HL=1 ELSE HL=0
380PROCRWDISK(TR,SE,1)
390PROCDDUMP(TR,SE,HL)
400ENDPROC
410DEFFPROCREAD
420CLS
430PROCGBTS
440A$=GET$
450IF A$="M" THEN 430
460ENDPROC
470DEFFPROCDDUMP(TR,SE,HL)
480VDU 31,0,0
490LOCAL T,S,X
500IF HL=1 THEN S=BLK+128 ELSE S=BLK

```

```

510 FOR T=S TO S+127 STEP 8
520PRINT;FNHX(((TR*1000)+(SE*100))+T-
S-((HL=1)*128),4);" ";
530FOR X=0 TO 7
540PRINT;FNHX(X?T,1);" ";
550NEXT
560FOR X=0 TO 7
570IF (X?T>32 AND X?T<127) OR X?T>160
THEN VDUX?T ELSE PRINT;". ";
580NEXT
590PRINT
600NEXT
605 VDU 3
610ENDPROC
620DEFFFNHX(V,F)
630LOCAL T,A$
640FOR T=0 TO F
650A$=STR$(V MOD 16)+A$
660IF (V MOD 16)>9 THEN A$=RIGHT$(A$,2)
A$=CHR$(V MOD 16)+65-10)+A$
670V=V DIV 16
680NEXT
690=A$
700DEFFPROCRWDISK(T,S,RW)
710REM READ IS 1 ****
720LOCAL RDWT
730IF RW=1 THEN RDWT=&53 ELSE RDWT=&4B
740?PARA=0
750?(PARA+1)=BLK
760?(PARA+5)=3
770?(PARA+6)=RDWT
780?(PARA+7)=T
790?(PARA+8)=S
800?(PARA+9)=&21
810A%=&7F
820X%=PARA MOD 256
830Y%=PARA DIV 256
840CALL &FF1
850IF ?(PARA+10)<>0 THEN VDU 7:PRINT T
AB(0,22)"RW ERROR ":ERR
860ENDPROC
870DEFFPROCEDIT
880CLS
890PROCGBTS
900VDU 31,6,0
910*FX 4,1
920REPEAT
930A=GET
940IF A=136 THEN A=8
950IF A=137 THEN A=9
960IF A=138 THEN A=10
970IF A=139 THEN A=11
980IF A=0 THEN PROCWRITE:GOTO 1060
990IF VPOS>15 THEN A=11
1000IF VPOS=0 AND A=11 THEN VDU 31,POS,
0:GOTO 1050
1010IF POS<6 THEN A=9
1020IF POS>39 THEN A=8
1030IFA=13 THEN VDU 31,6,VPOS:GOTO 1050
1040PRINT;CHR$(A);
1050UNTIL FALSE
1060*FX 4,0
1070ENDPROC
1080DEFFPROCWRITE
1090PRINTTAB(15,22)"No. or ASCII ?"
1100A$=GET$
1110IFA$="A" THEN PROCWRITEL ELSE PROCW
RITEN
1120ENDPROC

```

```

1130DEFPROCWRITEN
1140IF FNCHAR(10,22)="H" THEN S=BLK+128
ELSE S=BLK
1150FOR T=S TO S+127
1160X=((T-S)*3)
1170?T=EVAL("&"*(FNCHAR((X MOD 24)+6,X
DIV 24))+FNCHAR((X MOD 24)+7.X DIV 24))
118ONEXT
1190PROCWPRQM
1200ENDPROC
1210DEFPROCWPRQM
1220PROCWDUMP (TR,SE,HL)
1230PRINT TAB(15,22)"Write to disk ?"
1240*FX 15,0
1250A#=GET#
1260IF A#(">")"Y" THEN ENDPROC
1270*FX 15,0
1280PRINTTAB (15,22)"Positive ??????"
1290A#=GET#:IFA#="Y" THEN PROCRWDISK (TR
,SE,0)
1300ENDPROC
1310DEFFNCHAR(X,Y)
1320LOCAL AX,LX,LY,C
1330LX=POS
1340LY=VPOS
1350VDU 31,X,Y
1360AX=135
1370C=USR (&FFF4)
1380C=C AND &FFFF
1390C=C DIV &100
1400VDU 31,LX,LY
1410=CHR#(C)
1420DEFPROCDISS
1430 CHAIN"DSSEM"
1440ENDPROC
1450DEFPROCACAT
1460CLS
1470*CAT
1480A=GET
1490ENDPROC
1500DEFPROCINFD
1510CLS
1520*INF0 *.*
1530A=GET
1540ENDPROC
1550DEFPROCDDISK
1560LOCAL T,S
1570CLS
1580FOR T=0 TO 39
1590FOR S=0 TO 9
1600PROCWDISK (T,S,1)
1610PROCWDUMP (T,S,0)
1620PROCWDUMP (T,S,1)
163ONEXT
164ONEXT
1650ENDPROC
1660DEFPROCWRITEL
1720IF FNCHAR(10,22)="H" THEN S=BLK+128
ELSE S=BLK
1730FOR T=S TO S+128
1740X=T-S
1750K=ASC (FNCHAR ((X MOD 8)+30.X DIV 8))

1760IFK<>ASC (".") THEN ?T=K
1770NEXT
1775PROCWPRQM
1780ENDPROC

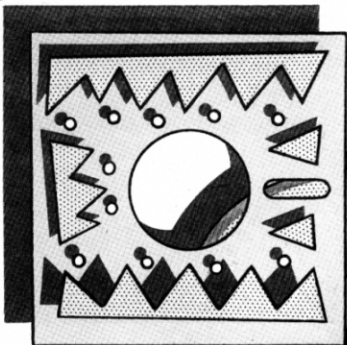
```

Example of screen printout

```

TRACK 0
SECTOR 0
Hi or Low L
00000 31 32 33 34 35 36 37 38 12345678
00008 52 45 4D 20 20 20 20 24 REM1...#
00010 52 45 4D 20 20 20 20 24 DIR...#
00018 44 49 52 20 20 20 20 24 MAIL...#
00020 4D 41 49 4C 20 20 20 24 COMMENT#
00028 43 4F 4D 4D 45 4E 54 24 SLIST...#
00030 53 4C 4F 53 54 20 20 24 RECDV...#
00038 52 45 43 4F 56 20 20 24 DD....#
00040 44 44 20 20 20 20 20 24 CAT....#
00048 43 41 54 20 20 20 24 STIKM1.#
00050 53 54 49 4B 4D 31 20 24 SURR0N2#
00058 53 55 52 52 4F 4E 32 24 SURR...#
00068 53 55 52 52 20 20 20 24 SURR...#
00070 50 4D 53 49 4D 20 20 24 PMSIM...#
00078 45 44 20 20 20 20 24 ED....#

```



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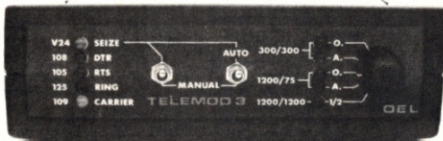
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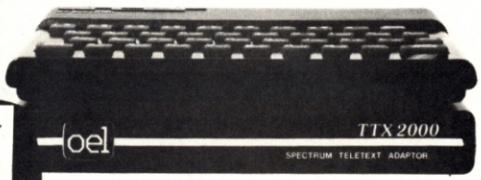
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PRINTER PATTERN

Producing stunning graphics on the Commodore 64 is easy enough, but what do you do with them when they're finished? Simon Taylor's program lets you print them out to keep for posterity.

Some time ago I bought a Koala graphics pad. This allows you to produce good high-resolution graphic displays, but they (and displays produced by other means) can't easily be printed out. With a little thought, however, it is possible to write a routine that will enable you to print out your creations.

I use an Epson printer, but the routine presented here can be made to work on most other Japanese printers, as most manufacturers now use the Epson control codes as standard.

The main problem involved in producing a high-resolution dump on the 64 lies in the way graphics are stored in memory. Each byte displays eight pixels of data, but memory is allocated in a

similar manner to the way characters are stored on screen. Each character position has eight bytes of equivalent high-resolution memory as shown in Table 1.

The problem with this method of storage is that the printer requires the pixels to be sent in a vertical form as the print-head travels across the paper. The routine 'Rotate' solves this problem. All the software for handling the Centronics port is included in the program.

Using the program

Enter the program using either an assembler or the Basic loader given here. The routine is located in spare memory at \$C000 (49152 decimal), which means no memory is lost when using Basic.

To operate the program, simply `POKE` location 251 with the start address of the high-resolution screen divided by 256, so if, for example, the high-resolution screen starts at \$6000 (24576) the value to `POKE` will be 24576/256=96.

Then you should `POKE` 252 with the

number of spaces by which you wish the picture to be offset towards the centre of the page (15 is dead centre). This value should be between 1 and 30. Call the routine with a `SYS` 49152 (the start of the program), and the printer will dump your high-resolution screen to the printer.

Table 1

	MSB				LSB
BYTE 0					
BYTE 1					
BYTE 2					
BYTE 3					
BYTE 4					
BYTE 5					
BYTE 6					
BYTE 7					

Method of storing HI-RES on CBM 64

Example listing

```

1 rem example of printing hires picture in memory at $6000
10 poke251,96           :rem set page number of hires picture
20 poke252,15          :rem set number of chars in margin
30 sys49152             :rem print picture

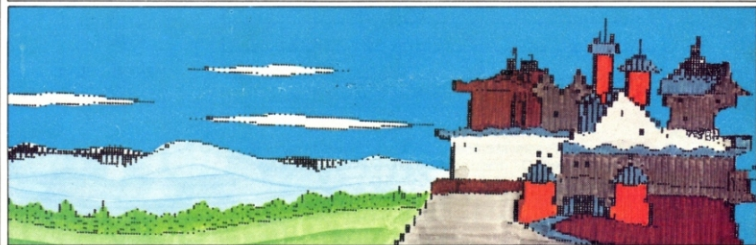
```

Basic loader listing

```

1 rem basic loader for machine code
10 data169,255,141,3,221,169,0,133,253,165,251,133,254,169,25,141,167,2,169
20 data13,32,162,192,166,252,169,32,32,162,192,202,208,248,162,0,189,192,192
30 data32,162,192,232,224,6,208,245,169,40,141,168,2,169,128,141,170,2,160
40 data0,140,169,2,152,170,177,253,45,170,2,240,22,169,128,24,8,72,104,40,106
50 data8,72,202,16,248,104,40,42,13,169,2,141,169,2,200,192,8,208,220,173,169
60 data2,32,162,192,24,110,170,2,144,203,24,165,253,105,8,133,253,165,254,105
70 data0,133,254,206,168,2,240,3,76,51,192,169,13,32,162,192,169,10,32,162
80 data192,206,167,2,240,3,76,23,192,162,0,189,198,192,32,162,192,232,224,2
90 data208,245,96,141,1,221,138,72,173,0,221,170,41,251,141,0,221,173,13,221
100 data41,16,201,16,208,247,138,141,0,221,104,170,96,27,49,27,75,64,1,27,50
200 fori=49152to49351:reada:pokei,a;t=t+a;nexti
210 ift<>24923thenprint"typing error - check data statements!"

```



Program listing

```

line# loc  code      line
-----
00001 0000
00002 00fb
00003 00fb      screen  ==+1
00004 00fb      spaces  ==+1
00005 00fc      point   ==+2
00006 00fd
00007 00ff
00008 00ff      ==$B2a7
00009 02a7      lines   ==+1
00010 02a8      chars   ==+1
00011 02a9      value   ==+1
00012 02aa      mask    ==+1
00013 02ab      porta=$dd00
00014 02ab      portb=$dd01
00015 02ab      ddrb=$dd03
00016 02ab      flag1=$dd0d
00017 02ab
00018 02ab      ==$c000
00019 02ab      lda $f0ff
00020 c000 a9 ff      sta ddrb
00021 c002 8d 03 dd      lda $f000
00022 c005 a9 00      sta point
00023 c007 05 fd      lda screen
00024 c009 a5 fb      sta point+1
00025 c00b 05 fe      lda E25
00026 c00d a9 19      sta lines
00027 c00f 8d a7 02      lda $f0d
00028 c012 a9 0d      jsr chROUT
00029 c014 20 a2 c0
00030 c017
00031 c017 a6 fc      linout  ldx spaces
00032 c019 a9 28      spcs   lda E'
00033 c01b 20 a2 c0      dex    jsr chROUT
00034 c01e ca
00035 c01f a0 f8      bne spcs
00036 c021 a2 00      ldx $c000
00037 c023 bd c0 c0      sndcd0 lda codes0,x
00038 c026 20 a2 c0      jsr chROUT
00039 c029 e8
00040 c02a 00 06      inx    cpx $f006
00041 c02c d0 f5      bne sndcd0
00042 c02e a9 28      lda $f08
00043 c030 8d a8 02      sta chars
00044 c033 a9 00      nxtchr lda $X10000000
00045 c035 8d aa 02      sta mask
00046 c038 a0 00      sndgrp ldy $c000
00047 c03a 8c a9 02      sty value
00048 c03d 98      loopy  tya
00049 c03e aa      tax    lda (point),y
00050 c03f b1 fd      and mask
00051 c041 2d aa 02      beq norot
00052 c044 f0 16      lda $X10000000
00053 c046 a9 00      cbc
00054 c048 18      php
00055 c049 00      pha
00056 c04a 48      rotate pla
00057 c04b 68      plp
00058 c04c 28      ror a
00059 c04d 6a      php
00060 c04e 00      pha
00061 c04f 48      dex    bpl rotate
00062 c050 c8 18 fb      pla
00063 c051 68      plp
00064 c053 28      ror a
00065 c054 2a      ora value
00066 c055 8d a9 02      sta value
00067 c059 8d a9 02      norot iny
00068 c05c c8      bne loopy
00069 c05d c0 00      lda value
00070 c05f d0 dc      jsr chROUT
00071 c061 a9 02      cbc
00072 c064 20 a2 c0      ror mask
00073 c067 18      bcc sndgrp
00074 c068 6e aa 02      cbc
00075 c06b 98 cb      lda c
00076 c06d 18      cbc
00077 c06e a5 fd      lda point
00078 c070 69 00      adc $f000

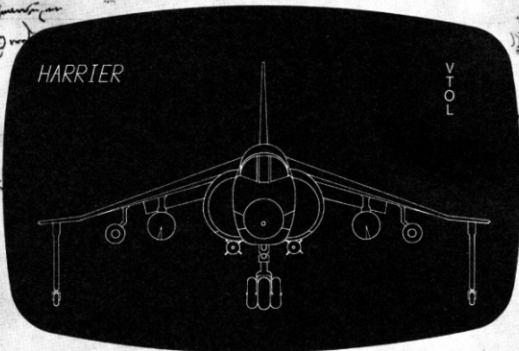
```

```

;zero page reserves
;(u) indicates that user must
;set these variables from basic
;location of screen (u)
;offset into page (u)
;pointer to current hr addr.
;
;other variables
;# of lines to print
;# of chars to print
;temp for rotation
;used to select bits
;
;cia reg for strb signal
;data register
;used to set output
;read ack signal
;
;14k of free memory on cba 64
;all lines as output
;on port b
;100 byte of pointer
;at beginning of page
;this is the page number
;set pointer for graphics
;25 lines on a screen
;in variable register
;make sure we are on a nl
;reset carriage
;start of 1 line of hires data
;send spaces according
;to number defined
;before calling.
;not zero yet?
;if not, send another one
;get printer into hires
;mode
;by sending codes from
;data table at end of prog
;
;send codes for graphics
;40 chars on a line
;character counter
;look at highest bit first
;mask used to get ind. bits
;look at lowest bit
;zero value register
;get y into
;x register - use it later
;get graphic
;is relevant bit set?
;no it isn't!
;load one bit for shifts
;carry would shift in
;push registers as loop
;uses stack
;restore registers
;and carry flag
;rotate 1 bit to right
;save registers
;while x is tested
;1 off of x
;not finished yet
;restore registers
;again!
;always one too many shifts
;update value used
;is graphic for printer
;next location
;end of character?
;no - so do next loc.
;get value in case via norot
;output the graphic now
;make sure no carry, and
;check next bit
;have we done last bit yet?
;never add one too many
;increment pointer
;by adding 8 to

```

Drawing and words...



It took the rare skill of Leonardo Da Vinci to conceive of manned flight and to be able to portray his ideas.

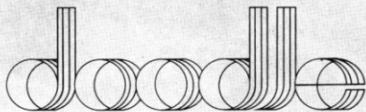
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OUTPUT: 64 SCREEN DUMP

Program listing (continued)

```

00000 c072 85 fd          sta point
00001 c074 a5 fe          lda point+1
00002 c076 69 00          adc £800
00003 c078 85 fe          sta point+1
00004 c07a ce a8 02          dec chars
00005 c07d f8 03          beq nxtlin
00006 c07f 4c 33 c0          jmp nxtchr
00007 c082 a9 0d          nxtlin lda £80d
00008 c084 20 a2 c0          jsr chrout
00009 c087
00010 c087 a9 0a          lda £80a
00011 c089 20 a2 c0          jsr chrout
00012 c08c ce a7 02          dec lines
00013 c08f f8 03          beq return
00014 c091 4c 17 c0          jmp linout
00015 c094 f8 03          return lda £800
00016 c096 a2 00          sndcd1 lda codes1,x
00017 c098 bd c6 c0          jsr chrout
00018 c099 20 a2 c0          inx
00019 c09c e0 02          cpx £802
00020 c09d e0 02          bne sndcd1
00021 c09f d0 f5          rts
00022 c0a1 60
00023 c0a2
00024 c0a2 8d 01 dd          chrout sta portb
00025 c0a5 0a          txa
00026 c0a6 40          pha
00027 c0a7 ad 00 dd          lda porta
00028 c0aa aa          and £fb
00029 c0ab 29 fb          and £fb
00030 c0ad 8d 00 dd          sta porta
00031 c0b0 ad 00 dd          lda flag1
00032 c0b3 29 10          and £810
00033 c0b5 c9 10          cmp £810
00034 c0b7 d0 f7          bne wait
00035 c0b9 0a          txa
00036 c0ba 8d 00 dd          sta porta
00037 c0bd 60          pla
00038 c0be aa          and restore
00039 c0bf 60          tax
00040 c0c0          rts
00041 c0c0          ;
00042 c0c0          ;store byte to send on port
00043 c0c0          ;save x register
00044 c0c0          ;on stack
00045 c0c0          ;current state of porta
00046 c0c0          ;save it in x
00047 c0c0          ;stroke is low level
00048 c0c0          ;output it
00049 c0c0          ;wait for
00050 c0c0          ;acknowledge signal
00051 c0c0          ;has it arrived?
00052 c0c0          ;not yet!
00053 c0c0          ;restore
00054 c0c0          ;port a
00055 c0c0          ;and restore
00056 c0c0          ;x register
00057 c0c0          ;that's it !!!
00058 c0c0          ;
00059 c0c0          ;
00060 c0c0          ;
00061 c0c0          ;
00062 c0c0          ;
00063 c0c0          ;
00064 c0c0          ;
00065 c0c0          ;
00066 c0c0          ;
00067 c0c0          ;
00068 c0c0          ;
00069 c0c0          ;
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00101 c0c0          ;
00102 c0c0          ;
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00106 c0c0          ;
00107 c0c0          ;
00108 c0c0          ;
00109 c0c0          ;
00110 c0c0          ;
00111 c0c0          ;
00112 c0c0          ;
00113 c0c0          ;
00114 c0c0          ;
00115 c0c0          ;
00116 c0c0          ;
00117 c0c0          ;
00118 c0c0          ;
00119 c0c0          ;
00120 c0c0          ;
00121 c0c0          ;
00122 c0c0          ;
00123 c0c0          ;
00124 c0c0          ;
00125 c0c0          ;
00126 c0c0          ;
00127 c0c0          ;
00128 c0c0          ;
00129 c0c0          ;
00130 c0c0          ;
00131 c0c0          ;

```

codes0 .byte 27,'1',27,75,64,01
codes1 .byte 27,'2'
.epson codes for 7/72 line spc
;and hr mode (320 data items)
!(esc k)
!change these for non-epson
!printers as described in text
;codes to restore 1/6 line spc
!
.end

Table 2: Symbols and their values

symbol	value	chrout	c0a2	codes0	c0c0	codes1	c0c6
chars	02a8	flag1	dd0d	lines	02a7	linout	c017
ddrb	dd03	mask	02aa	norot	c05c	portb	c033
loopy	c03d	point	00fd	porta	dd00	portb	dd01
nxtlin	c082	rotate	c04b	screen	00fb	sndcd0	c023
return	c094	sndgrp	c038	spaces	00fc	spcs	c019
sndcd1	c096	wait	c0b0				
value	02a9						

end of assembly



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BACK TO THE GREEK

Adventure playing is now a weekly activity in the pages of PCN. This week the intrepid Mike Gerrard gives an account of his travels on *The Odyssey of Hope*, a stylish adventure. Problems are solved here too, so if you're stumped just write to Dungeon Master, PCN, 62 Oxford Street, London W1A 2HG.

Literary works are proving to be a fertile source of material for adventure writers, from *The Hobbit* to *Sherlock Holmes* by way of Dante's *Inferno*, though of course the adventures still have to be good. *The Odyssey of Hope*, for the 48K Spectrum, is not a straight adaptation of any one particular book, but plunders several areas of the Greek myths and does it in great style — one of the most enjoyable adventures I've seen for several weeks.

Zeus on the loose

Side one of the tape contains the introduction, with the game program on side two. This is one of those rare, if not unique adventures where the instructions are worth looking at for their own sake. That's because they're printed on the pages of a book, which flip over rather nicely as you press the Enter key, and some of them are illustrated.

'Once upon a time,' the story begins, 'Zeus had one of his master craftsmen fashion a mortal of perfect beauty — the first woman. He called her Pandora — meaning all gifts.' The pages turn to explain that Zeus gave Pandora a golden casket, but forbade her to open it.

Cynical readers might ask why bother giving it to her in the first place, but then there wouldn't be a story or an adventure, as naturally curiosity got the better of her and she lifted the lid. This released all the ills that now beset mankind, so if you're bothered by disease, sorrow, hate, jealousy, theft, lies or anything along those lines, write to Pandora . . . or failing that, Claire Rayner. The only thing remaining in the casket when Pandora rushed to close the lid was Hope (and there are some excellent animated graphics illustrating the escape of the various woes, with Hope remaining in the shape of a butterfly).

Needless to say, some charmer comes along and steals Hope, giving you the chance to become a hero and return Hope to its home on Mount Olympus. Maybe Zeus will even slip you a few drachma and a cup of hot nectar by way of reward.

The game itself is a graphics adventure with the traditional simple noun-verb input, except when you decide to attack something. Then you're allowed the luxury of KILL CYCLOPS WITH FLUTE, or whatever your chosen weapon happens to be. Movement commands are abbreviated to the first letter, as are Inventory, Help, Total score and Quit game (Save option included). Though Look isn't used to redescribe the location as usual, it tells you if there's anything else around in that location.

In fact you don't need to Look in the first location, the oracle's temple, as you can hear what's there: the hissing of a python. That's why I say the game has style as there are other sound effects too, including the buzzing of bees in the meadow south of the temple, which contains a dead cow. The meadow, that is, not the temple, as it's dead rather than sacred. If you linger too long round the bees or the python it might be bad for your health, although both can be put to good use if you can work out how.

Some of the other problems presented to you early on include a wooden hut which contains a table and a workbench with lots of interesting items, but unfortunately the hut also has a door that closes behind you as soon as you go in. I've tried opening it with everything inside, even the fish in a moment of desperation, but I remain resolutely locked in there for the time being. Perhaps I should write to the PCN *Dungeon* page and ask myself how to get out.

Centaur Spread

Many of the first batch of locations have you at sea, and there's a lot of drowning going on, particularly if you can't remember how to cope with the seductive singing of the Sirens. Other creatures you might be familiar with, though not too familiar one hopes, are centaurs, harpies and naiads.

The graphics are not stunning but are quite pleasant and do have the virtue of appearing instantly, though I wish the same could be said of some of the

responses, which take an age to appear. You can almost hear the program saying 'Now hang on, I've just got to check that. Don't go away, I know it's in here somewhere.' But it does at least seem to be thoroughly done, with no odd responses or noticeable bugs, though there is one spider outside the neglected house. The house has three floors — quite impressive by ancient Greek standards, I'd have thought.

And by adventure standards this game is quite impressive too, taking you a little bit further each time, with something to investigate in about every other location and one or two nice touches of humour here and there. At £5.95 it's reasonably priced, and published by Software Communications, Martech House, Bay Terrace, Pevensey Bay, East Sussex BN24 6EE. I wonder if they get a lot of trouble from the Cyclops down Pevensey Bay way.

Getout clues

Though sometimes unable to help myself with clues, I'll try to help readers where possible, such as Douglas Jeffries of Norwich who bought *Dragon Data's Seaquest* which I'd praised in an earlier column. Having encouraged him to buy it, Douglas thinks the least I can do is help him solve it by explaining how to open the clam that he's discovered on the sea bed. Provided you can read backwards, the answer is: LEVO HSEH THTI WMAL CEHT NEPO.

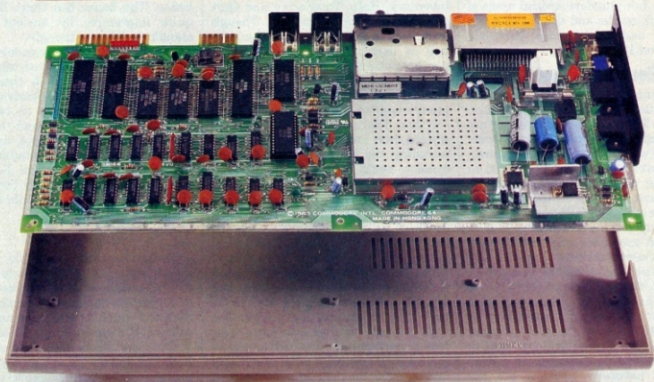
Douglas also asked about other recommended *Dragon* adventures and, of course, the Mysterious Adventures series, successful on other machines, is now available for the *Dragon* from Channel 8. I'd certainly consider buying *The Hulk* from Adventure International, though be prepared for a tougher one. I've also just received a copy of *Return of the Ring*, Wintersoft's long-awaited follow-up to *The Ring of Darkness*, and perhaps there'll be room for a detailed look at that in a later column.

This column is going to be a weekly feature in PCN from now on for adventure hits and Greek myths alike.



COMMODORE 64 INSIDE OUT

The Commodore 64 is one of the most successful micros on the market. Peter Worlock investigates its popularity and the wealth of software that has helped to consolidate the 64's position.



Equipment supplied by Tomorrows World Today

The 64 is now a little under two years old, although it has been widely available for only 18 months. In the time-scale of personal computers, this makes it something of an old-timer. However, rather than being a reason for dismissing it in favour of some of the hot, new arrivals, its age acts in its favour. The 64 is now in that golden period where it has been around long enough, and sold in such numbers, that it has considerable software and peripheral support—but it still hasn't been drained of potential. Some of the best may yet be to come.

The reason for its phenomenal success

is the balance between price and performance. For around £200 (less in many shops) you get an excellent technical specification: 64K RAM, 16 colours, sprite graphics, 320 x 200 high-resolution graphics and the best sound facilities of any micro. Added to this is a keyboard of near professional quality and a range of expansion options.

Of course, it is not without drawbacks. I have a vision of Commodore's corporate structure which includes a product development team, and a handicapping department. The development people come up with a computer offering more memory, more colour, better sound at a

lower price than its rivals. The handicappers (who occasionally display more creativity than other departments) then throw in a truly lousy Basic and, with breathtaking originality, add a range of non-standard interfaces that will drive many owners to despair. But thanks to third-party ingenuity, these problems are not as serious as they once were.

Hardware

The 64 comes in one, largely self-contained unit. While it was never going to win any design awards, it doesn't have many faults. The power supply is an external box which gives you one extra



cable but eliminates overheating problems. Even after several hours' use the 64 gets barely warm.

The keyboard is a full-travel type with a front-to-back incline that makes it suitable for touch-typing. The 66 keys include full alphanumerics, a shift-lock that really locks, four programmable function keys and a real space bar. Cursor control is from two dedicated keys for down and right, shifted for up and left. There is no reset or break key, but a warm system reset can be made by use of the RUN/STOP and RESTORE keys.

Along the right side of the unit are two input ports for joysticks, light pens or paddles, the power socket and an on/off switch.

Around the back are the expansion ports. There are a large number of these but, sadly, they are non-standard. At rear right is the expansion port for cartridge software and cartridge-driven peripherals. Next come three display sockets, for TV (the 64 has a built-in modulator), and monitor, with a channel selector allowing you to tune your computer for the best display.

The main expansion bus is Commodore's own serial system which drives all 64 peripherals such as printers and disk drives. Next to that is the cassette port, followed by the user port — a parallel port that emulates both RS232 and IEEE parallel interfacing. You can attach modems, and non-Commodore devices here, or Commodore peripherals using IEEE designed for its business machines.

Although Commodore occasionally suffers a flurry of bad publicity when a batch of machines falls below standard, generally the 64 is well-constructed and reliable and complaints have never reached the proportions suffered by the likes of Sinclair and Oric.

One common moan relates to the amount of memory left free to the user — generally nowhere near the 64K advertised. The 64 actually has more than 80K of memory in RAM and ROM but the way the memory map is configured leaves about 38K free to Basic programs. Of the rest, 8K is taken by the Kernal operating system, 8K by Basic ROM, 4K in I/O ROM, and 2K for screen memory and operating system storage. This leaves

42K free but a further 4K is above Basic memory.

However, a little machine code programming opens things up considerably and it is possible to reconfigure the



memory map in several ways giving up to 60K free for various requirements. In high-resolution mode, for example, (regardless of Oric's grossly misleading advertising for the Atmos) you can have two 8K hi-res screens and still leave your 38K untouched, a feature used by BC Basic (see the Software panel). This is a better deal than any other home computer offers.

The key to memory management is the 6510 main processor used by the 64. This is a development of the popular 6502 used by Acorn, Apple, and Atari to name but a few. It has the benefit of using the same instruction set, but features two extra registers which control the way the processor looks at the memory map. In normal operation the 64 'sees' the Basic and Kernal ROMs in high memory, but by altering the registers in the 6510, it can be made to see the RAM beneath. This makes for a very flexible system but the catch is that it takes a short machine code routine to do it.

Documentation

In the first instance, pretty awful. The book included free with the machine, the User Manual, is ideal for the absolute novice but most users will surpass it within a couple of weeks. The book you need is: Commodore's *Programmer's Reference Guide*, a 490-page tome that contains all the technical detail you need, right down to full circuit diagrams. It should be given away with the machine but at the moment you have to buy it separately at about £10 (some shops will try to charge £15 — head for the door, yelling abuse as you go).

There are dozens of independent books covering every aspect of programming and using the 64. The best have been reviewed in PCN, but a good all-purpose supplement to the: *Programmer's Reference Guide* is *Using the 64* by Pete Gerrard (£10 from Duckworth).

Basic

Ah well, everyone makes mistakes. Not to put too fine a point on it, 64 Basic is stunning in its awfulness.

It's not that it's so much worse than anyone else's, although it lacks some of the finer points like PROCEDURE, IF... THEN... ELSE and REPEAT... UNTIL. It's rather that having given the 64 such a tremendous hardware advantage in graphics and sound, Commodore failed to provide any Basic commands for controlling the features. Sprites, high-resolution, and sound require the prog-



rammer to delve into a morass of PEEK and POKE. Primitive? It's unforgivable.

Taking the kindest view, there are two redeeming factors. The first is that the 64 becomes an ideal machine for learning low-level programming since you are forced to become familiar with the machine on its own terms. The second is that a great number of people have devoted a lot of time in developing alternatives to the Basic so that the 64 has more language options than most of its rivals.

Display

The display is probably the most attractive feature of the 64. It features a range of graphics modes which give it a hard edge in the games arena.

Text display is 40 × 25 in upper and lower case. It supports 16 colours available directly from the keyboard, and an extensive block graphics system. It is possible to redefine the entire character set and additional multicolour and extended background colour modes make it a natural winner for games. However, the real games strength comes from its sprite graphics, a set of eight 24 × 21 high-resolution characters that make sophisticated animation easy. Machine code programming increases this number considerably and some commercial games feature as many as 32 sprites on screen at once.

For more sophisticated needs, the 64 can be programmed in 320 × 200 high resolution mode in two of the 16 colours, or 160 × 200 multicolour mode which gives you four of 16 colours.

The display is memory-mapped with all graphics handled by a dedicated video chip, and the different effects, colours and modes are relatively easy to program, although the addition of INK, PAPER, BORDER, PRINT AT and MODE commands would have been welcome all the same.

There's one
big difference
between the IBM PC
and the computer below,
and it's only fair that
you should
know about it.



Advance 86h specification. Intel 8086 CPU. MS DOS operating system. Twin-disk drives. 128K RAM expandable to 640K. Interfaces for light pen, printer/plotter, joystick, monitor and RS232C. Capacity for 4 expansion boards, plus a further 2 true 16 bit slots. Graphics - 16 colours, 80/40 columns x 25 row text, 640 x 200 pixels. Package illustrated Kaga KP810 Printer (with NLQ) £345.00 inc. VAT and Novex 12" Monitor (amber) £89.95 inc. VAT.

 Subject to availability. Prices correct at time of going to press. 

The Ferranti Advance 86b costs only £1,499 (inc. VAT). The IBM PC equivalent will cost you a lot more than that.

Which is a big difference. But there's also a big similarity in that the Advance 86b runs IBM software, and runs it faster than any equivalent IBM PC. For the simple reason that it uses a more advanced microchip.

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What's more, it comes with four free software programs – spreadsheet, wordchecker, word processor and database.

The package shown includes a monitor and printer and at £1933.95 (inc. VAT) still costs less than the equivalent IBM PC package.

And because the Advance 86b is available at all 33 W. H. Smith computer shops listed below, why not come in and see one.

WHSMITH

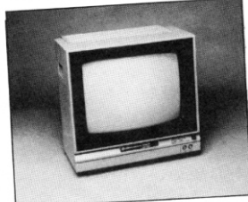


Birmingham, Bradford (Broadway), Bristol, Cambridge, Cardiff, Edinburgh, Exeter, Glasgow, Kingston-upon-Hull, Leeds, Leicester, Liverpool, London: Brent Cross, Bromley, Croydon, Ealing, Hammenersmith, Heathrow Airport, Holborn Circus, Kensington High Street, Kingston-upon-Thames, Sloane Square, Wood Green, Manchester, Newcastle-upon-Tyne, Northampton, Nottingham, Plymouth, Reading, Sheffield, Southampton, Swansea, Wolverhampton.

Sound

Sound on the 64 is streets ahead of anything else available. Another dedicated chip, the Sound Interface Device (SID) takes care of this department although, again, there are no Basic commands to use it. This is perhaps the 64's greatest sin — since SID is so powerful, it is inevitably complex.

Among the host of features available are three independent voices, four waveforms including white noise, programmable ADSR envelopes, full filtering, and special effects like ring modulation



and synchronisation. With a bit of gadgetry, it's possible to use the 64 as a dedicated synthesiser, mixing outside sound sources like keyboards and guitars, with the output from SID.

This power has led to a range of software packages to allow you to get the most from the machine and some of these are truly remarkable.

Anyone who doubts the superb quality of 64 sound should try to listen to one of Alligata's games like *Loco*. Otherwise, suffice it to say that if you've been impressed by 64 graphics, the sound is as good or better.

Storage

Apart from the Basic, this is the major weakness of the 64. Commodore sells a dedicated cassette unit (the company claims to be one of the biggest tape deck manufacturers in the world, in which case it ought to know better). It will cost about £40 which is £15 too much, it's very reliable but chronic ('long-continued, very bad, objectionable' — *Penguin English Dictionary*). The trouble is that with all that memory you've got big programs and you'll grow old and wizened waiting for them to load.

Alternatives include buying a cable that allows you to use your ordinary music cassette player, or getting one of the independent tape units which have appeared in the last few months. They're just as good and a bit cheaper.

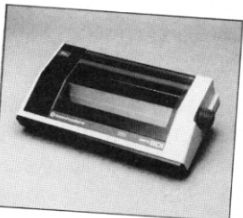
Most games producers now use turbo-loading systems which make tape fast almost as fast as the 1541 disk drive. If you come across a package not using them, write the company a rude letter.

The next step is the 1541 itself. This is a monstrously large unit, almost as big as the 64 itself and it's s-l-o-w... because, for reasons known only to

Commodore, it uses the serial bus which means that it sends data one bit at a time, instead of one byte at a time.

The 1541 uses single-sided disks which hold about 166K of data. The drive itself has a 6502 processor which makes it 'intelligent' (computer jargon for 'unspeakably dumb') and has the most convoluted operating system. On most disk systems you can say something like DEL to delete a file. On the 1541 you say OPEN15,8,15:PRINT15,"SCRATCH:filename":CLOSE15. I suspect the phrase 'user-friendly' has yet to penetrate Commodore's consciousness.

That said, there are reasons to buy the 1541, not least of which is that the best



software is only available on disk and will remain so for practical reasons: software like the Infocom adventures, the SubLogic Flight Simulator, and most serious applications and business packages — good enough?

Expansion

There are gizmos, gadgets, black boxes and bits of circuitry to handle just about any application. The only snag with plugging things into your 64 is the bizarre interfacing. The 64 claims things like RS232 and IEEE but both are non-standard implementations, and most printers are Centronics devices, not supported on the 64 at all.

But, all is not lost. There is a wide range of devices that will give you standard RS232, IEEE and Centronics I/O. Once you have these, you can do what you like.

Monitors: Unmodulated output from the 64 is to composite video standard which means the choice of monitors is not as great as on some machines offering the more common RGB output. However, Commodore produces the 1701 14in colour monitor at about £200 which has medium resolution and a very crisp display. Recommended. Fidelity also makes a similar model at a similar price. Monochrome monitors are not a problem since they are all composite video.

Printers: Commodore itself supplies a range of printers from its four-pen printer/plotter, through the MPS801 and 1526 dot-matrix printers, up to its business printers running under IEEE. With the addition of an interface you can also use Epson, Mannesmann-Tally,

Gemini or any of the other independent, quality dot-matrix printers. Even allowing for the cost of the interface, they will often supply features at better value than Commodore's products.

Modems: Commodore's own is favourite here as it simply plugs in and goes. Otherwise, any RS232 modem with suitable interface will do the job.

Light pens: Endless numbers. See *PCN* back issues for reviews but the best ones tend to be American.

80-column cards: The wider display is the standard in the business world, and well-worth having for word-processing and similar applications. There are limited numbers available for the 64, most of them imported from the US and they tend to be expensive. The only one we know of in Britain comes from Zero Electronics and it sounds good. *PCN* will be reviewing this and others in the next few weeks. Before buying, check



whether they will operate with the software you already own. Some won't.

Others: Get hold of an American magazine like *Compute!* and drol. The US is a long way ahead in the add-on business. How about alternative but compatible disk drives, 128K RAM expansion boards, or a plug-in box that lets you run Apple software on your 64? All this and more at the cost of a transatlantic phone call, freight charges and a little strain on your credit card. Don't be afraid of doing it: tell them you're calling from Britain and you'll find them amazingly helpful.

Competition

Because of its features and pricing, almost anything competes with the 64 now, although when it was launched it filled an empty niche in the market. A changing market, coupled with the entry of Amstrad and Memotech, and the promise of the QL make things more difficult to define.

However, the basic advice to buyers is this: buy one of the best-sellers unless you have a good reason not to (and wanting to be different is a stupid reason), or, if you can wait for the software and expansion, pick one of the future best sellers. That narrows the field. Although there's no doubt that Amstrad will be very big, and so will the QL once Sinclair gets its act together (which won't be this year), the Spectrum remains the outstanding buy for begin-

ners and games players, or anyone not wanting to spend too much, while the BBC now looks grossly overpriced despite its high quality.

For a while then, the 64 still looks like the best buy for the money — a respectable compromise between price and power. Neither of Commodore's new machines will compete directly and 64 owners can look forward to support and back-up well into the future. The only serious challenger is the Amstrad, provided that the software and promised attractions like disk drives are forthcoming.

Verdict

In terms of fulfilling the promise of personal computers, the 64 has come closer than most. It's a superb games machine; with the alternative languages and toolkits, it's a good programmer's machine; and with the range of applications software and peripherals it's a workable machine for the small

Software supply

The software available for the 64 is one of its main strengths. In terms of quality, quantity and variety of software the 64 is as well-served as any computer and better than most. And the situation is still improving as British software companies sign up licensing deals with US producers. The reason for the wealth of material in the US is simple: while British programmers concentrated their efforts on the Spectrum, their American counterparts went for the 64.

Also due considerations are conversions from other machines. Many software publishers are now moving Spectrum software to the 64, while in the US they moved it from Apple and Atari providing a rich vein of programs.

Much of this US software is already available but you'll pay import prices — perhaps as much as £35 for disk-based programs.

Games

When it comes to games the 64 is hard to beat. The sound and graphics facilities make it a natural for top-quality programs. While the games support took a while to roll, it's exploded recently and a glance at PCN Charts will show that while second to the Spectrum in quantity, the quality is there already. *The Hobbit*, *Valhalla*, *Manic Miner* — all are available for the 64. Only *Ultimate* continues to deal exclusively in Spectrum.

But the 64 has attracted some excellent programming in its own right. Commodore's own *International Soccer* is one of the most outstanding games programs available for any machine. And now the flood of US material is upping the stakes further.

War gamers should check out Strategic Simulations' range of programs. *Colossus Chess* from CDS compares favourably with the best chess programs around while companies like Melbourne House, Quicksilva, Supersoft, Audiogenic and Llamasoft are producing a stream of packages.

Programmer's Aids

Every sort of utility is available from extensions to Basic, through assemblers and compilers to toolkits.

The best of the Basic extensions include BC Basic from Kuma and Simons Basic from Commodore, both on cartridge at about £50. They rectify

the serious omissions in 64 Basic and add a host of other commands.

Anyone looking beyond 6502 programming doesn't need to buy a new machine — get the CP/M cartridge from Commodore instead. The Z80 is the best reason for buying the package — CP/M is not a serious option on the 64 given the drawbacks of the 1541, the 40-column screen and the lack of any CP/M software in 1541 format. But a second processor for £50 is a bargain.

For 6502 loyalists the two assemblers worthy of serious consideration are Commodore's own and *Mikro* from Supersoft. There's a bunch of tape-based simple assemblers, disassemblers and monitors, while if you don't want to get into machine code, Oxford Computer Systems and DTL of Colchester produce a range of Basic compilers in addition to Commodore's own *Petspeed 64*.

For general purpose toolkits check out Adamssoft of Norwich's Calco, which handles *Master* — possibly the ultimate programmer's aid, more a workshop than a toolkit.

Languages

Plenty to choose from here. Forth fanciers can try *Forth 64* from Audiogenic, or from Hesware; Oxford Computer Systems and Adamssoft have implementations of Pascal.

Commodore has a disk-based Logo package which is a full implementation, not just turtle graphics. All disk owners should consider buying it given the standard of Basic.

Applications

Whatever you want, they've got. The starting point is Commodore's Easy series — Script, File, Calc and Mail. They're all of a high standard and more than reasonably priced at about £50 each.

Dozens of word processors but the best include *Paper*, *Simply Wite*, *Vizawite* and *WordPro*. Databases include *Superbase*, Audiogenic's *Magpie*, *Mailpro* and *Oracle* from Kobra. For those in need of a spreadsheet the starting point should be Microsoft's *Multipan* converted from the IBM PC. Others include Supersoft's *Basicalc* and Practicoor's *Practical*. Plus uncountable packages for more specialised applications including accounting, stock control, sales and purchase ledgers.



business or professional user.

Of the criticisms outlined above, none is insurmountable, nor unique to the 64 — the ideal machine isn't available yet. And anyway, nobody said it was going to be easy... (all right, lots of people did but they were all lying).

The following is a list of 64 suppliers. It makes no attempt to be complete.

Computarama, Freeport, Stafford, ST16 2BR. Mail order supplier for 64 software and peripherals.

Six-Four Supplies Co, PO Box 19, Whitstable, Kent CT5 1TJ. Mail order supplier for 64 software.

Chromasonic, 48 Junction Road, Archway, London N19 5RD. Mail order hardware, software, peripherals.

Audiogenic, PO Box 88, Reading, Berks. Software and peripherals including Koalpad graphics tablet.

Supersoft, Winchester House, Canning Road, Wealdstone, Harrow, Middlesex. Software and peripherals.

Zero Electronics, 149 King Street, Great Yarmouth. 80-column card, EPROM programmers, motherboards.

Stack, 290-298, Derby Road, Bootle, Liverpool L20 8LN. Manufacturer, expansion boards, cartridges, light pens.

Tomorrow's World Today, 27 Oxford Street, London W1. Software, peripherals, US imported packages.

SPECIFICATION

Price	£220
Processor	6510 (6502-compatible)
RAM	64K, 38K free to Basic
ROM	20K
Display	40 × 25 text, 320 × 200 high resolution, 16 colours
Keyboard	66-key full travel, four programmable function keys
Storage	Dedicated cassette unit, 1541 disk drive, 166K single-sided
Language/OS	Commodore Basic. CP/M Z80 cartridge available

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PERIPHERALS: PRO-TEST: COMMODORE COLOUR

Barry Miles puts more colour into his Commodore machines with a dot-matrix printer that produces eight-colour graphics using a multi-coloured ribbon.

One drawback to owning a Commodore computer is finding a printer that is fully compatible. Commodore has, at last, brought out an eight-colour dot matrix printer that produces all the CBMSII characters and performs screen dumps, for £395.95.

Presentation

The machine comes in an attractive black case, complete with connecting cables and a set of smoked plastic paper feed lids.

Getting the printer going is simple; just install the paper, plug in the multi-colour ribbon cartridge, connect the cable up to your Vic or 64, and switch on.

The printer is sleek and has a good solid feel to it, weighing 5.5 kilos and measuring 48cm by 35.5cm by 14cm.

The apparent lack of control switches is soon solved: the flush top conceals the paper feed and power switches of the touch sensitive kind. Users of other printers may be surprised at the inability to switch the 801 off-and-on-line, and to carry out a form feed. There are no DIP switches to change the printer's operation, so this is a simple workhorse — versatility was not a major design aim.

Another difference between this and most other printers, is the absence of a paper out warning indicator. However, just before the paper is about to run out, the power light flashes continuously and the printing stops. Since the Commodore 801 is designed to be used with Commodore machines only, it does not really need the same flexibility as other printers.

The rear of the printer is pretty tight on connections; there are simply two of the Commodore serial pseudo IEEE DIN sockets. A welcome feature, however, is the switch that allows you to change the device number to 4, 5, or 6.

The MCS801 allows you to use paper from 11cm to 25cm inches wide on its tractor feed or roller mechanism. The matrix of the print head is 8x8, so descenders are rather short.

The colour range is black, cyan, purple, magenta, red, yellow, green and, of course, white. The line spacing is programmable in steps of 1/20ths of an inch with a default of 1/16th inch.

The 802 is rather slow with a rated speed of 38 cps. In practice, as with most printers, this is something of an overestimate. The printing is also somewhat noisy but the good fit of the lid reduces the noise to an acceptable level.



Documentation

The review documentation, *A Friendly Introduction To Your MCS801 Printer*, also bore the perturbing legend *Preliminary*. Further investigation made me long for the final version: an all-too typical quotation was:

'Scan mode is mostly used for high resolution graphics screen hard copy. When this mode is used, many data manipulation is needed, so Basic language sequence is too slow. Therefore when using hires-screen hardcopy, program should be written in machine language. However, beginner's don't know how to make machine language program. So attached demo disk include some hires screen hard copy program example. Hires screen is highly dependent on the computer, and the computer has many screen modes, demo programs are only samples.' Yes, well.

In use

The machine functions well and the paper remains on the tractors with the lid on, allowing the sheets to be torn off easily.

The use of the colour modes is fairly straight forward. Send CHR\$(20) followed by CHR\$(n), where n is a colour number between 0 and 7. The printer continues with the last specified colour until you change it.

Commodore uses secondary addressing to allow some control codes to the printer. Opening a file with the

appropriate secondary address and sending down the codes enables the various printer functions to be controlled.

A number of control options are available: the tab setting of the print head can be done in dot increments, and it is possible to repeat both 7 and 8-bit graphics. The print quality is good with the colour reasonably reproduced though you must take care to turn off the ink transfer from unused colours on your ribbon.

The machine comes with a demo disk that contains the source code for colour screen demos. For the sake of speed, it is pretty well essential that such programs are in machine code.

Verdict

The MCS801 is a good workhorse colour printer without frills. If colour and the ability to print Commodore graphics is important and you want compatibility with the Commodore 64 or Vic, this is a good buy.

REPORT CARD

Features	○	○	○	○	○	○	○	○	○	○
Documentation	○	○	○	○	○	○	○	○	○	○
Performance	○	○	○	○	○	○	○	○	○	○
Overall value	○	○	○	○	○	○	○	○	○	○

Product Commodore MCS801 colour dot matrix printer **Price** £395.95 **Distributor** Commodore Business Machines 01-757 4111
System Commodore 64, Vic 20, C16, Plus/4

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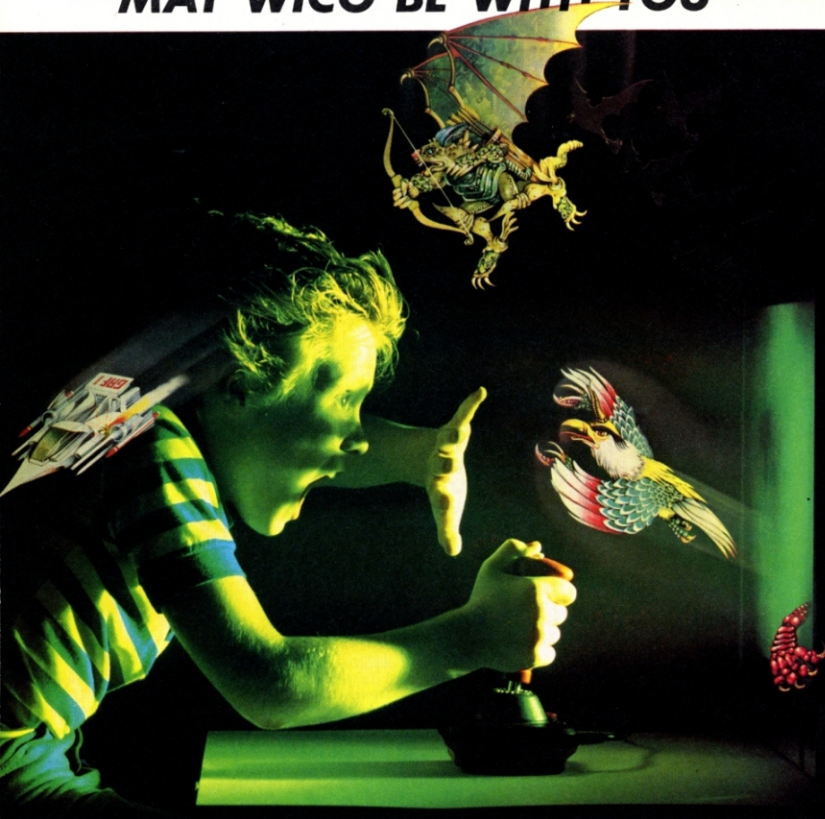
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JOYSTICK JUNKET

Programmable joysticks could be the gameplayer's best friend.

David Rosam plugs these three into his Spectrum.

Finding a joystick interface that lets you play almost any piece of software on your Spectrum is like finding a needle in a haystack.

One solution to the problem, for instance, could be a programmable joystick interface. Three new joysticks try to tackle different approaches to programmable interface design.

something of an amateur air.

The unit is compatible with Micro-drives, and takes standard Atari-type joysticks. The manufacturer claims that the duplicate edge connector on the unit is suitable for the Currah Microspeech unit, and there's probably no reason why you can't connect any other add-ons.

Cambridge Computing Intelligent Joystick

Opening the box reveals three components — the interface itself, a joystick and a cassette tape. The interface and cassette are available without the joystick, if you already have an Atari-type joystick. The interface itself is a small black box, about the size of a non-programmable interface, allowing one joystick to be connected. There's also a duplicate edge connector at the rear of the unit so you can connect other add-ons simultaneously.

To use the interface, connect the hardware, and then load the tape. Instructions are given as the program runs, so the whole process is quite simple.

The package is the most attractively presented of the three, and it's well made, but it's the most expensive.

Rainbow Electronics Interface

Another small unit allowing the connection of a joystick with a standard Atari-type plug is the Rainbow Electronics Interface. And it offers a small loudspeaker to supplement the small noises struggling from beneath the Spectrum. The Spectrum's edge connector is reproduced on the latest model.

No extra software is needed to program the interface. Instead, you must press keys, move the joystick, and operate a small switch on the interface, all at the same time. Sounds complicated? — well it is. If you happen to be an octopus it's no problem — otherwise just borrow an extra pair of hands . . .

The speaker on the unit doesn't have

good sound quality, and you'd be better off if you disconnect the 'load' wire, and engage 'record' on your tape recorder's speaker.

That way, you also gain control over the volume.

Verdict

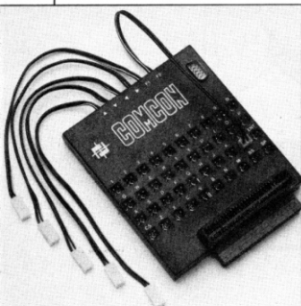
If you're in the market for a joystick interface, the programmable types are not quite as attractive as they sound on paper.

The biggest drawback with most programmable interfaces is that as soon as you turn off the power, they lose their programming.

Therefore, before playing any game, you must plod through all the preliminary palaver. This takes time, and can be quite a frustrating process. Personally, I find having to load up a tape or wrestle with three separate pieces of hardware puts me off playing a game in the first place.

The Comcon, with its crude connections will allow you to use the same programming day after day. Also, it is much the quickest to program.

Unfortunately, the standard of construction is rather worrying, particularly the way in which the wires connect with the plugs. But it's the cheapest of the three and if you're spoilt for choice it's the one to buy.



Comcon interface: the quickest to program.

Comcon Interface

Most programmable interfaces work by fooling the computer that it is receiving information from the keyboard. This is done by connecting the joystick into the port dedicated to the keyboard.

Comcon is by far the easiest to use of the three interfaces, but its construction is a let-down.

The unit is large for a Spectrum add-on, needing a fair amount of space behind the machine to accommodate the unit. On top is a dummy keyboard, consisting of rows of two-pronged connectors. Six wires protrude from the rear, (four for the directions and two fire button options) which you simply push onto the desired keys.

The crude plastic plugs give the unit

Product Comcon Programmable Joystick Interface **Manufacturer** Frel Ltd, 1 Hockeys Mill, Temeside Ludlow, Shropshire SY8 1PD, (0584 4894) **Price** £19.95 **Outlets** Mail order/retail.

Product Cambridge Computing Programmable Joystick **Manufacturer** Cambridge Computing, 1 Benson Street, Cambridge CB4 3QJ, (0223 32905) **Price** £29.95 **Outlets** Mail order/retail.

Product Rainbow Electronics Programmable Joystick Interface **Manufacturer** Rainbow Electronics, Glebe House, South Leigh, Witney, Oxfordshire, (0993 5432) **Price** £25 (inc P&P) (£27 for through-port model) **Outlets** Mail order.

Cambridge: best looking, but most expensive.



Rainbow electronics: no extra software needed.



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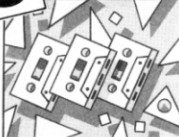
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SOFTWARE PRE-VIEW



We take a peek at the new software packages, and give you a taste of things to come. Note to software publishers: if you wish your company's product to be included, please send only the very latest releases to Bryan Skinner, Software editor, PCN, 62 Oxford Street, London W1A 2HG. Please don't forget to include prices and telephone numbers.

BBC



Virgin Games is having another crack at the software market. BBC owners won't be the only ones glad to know that this time the

games are of a fairly high standard. *Sinbad* is a two-screen action game involving flying carpets. The second screen is a 3D asteroids affair, later stages are difficult and well-done, but the game lacks variety.

Copter Capers	6.90	A&F 0706 341111
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The Uranium Factor	6.90	A&F 0706 341111
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Sinbad	7.95	Virgin 01 727 8070

SPECTRUM



Avalon looks set to burst on the software scene like *Atic Atac*. Indeed, there are similar concepts involved. You take on the role of Maroc the magician's astral projection — control is best with a joystick and the graphics are superb. The aim is to seek out the Lord of Chaos inside the hill of Avalon on the Isle of Glass. Floating around the hundreds of rooms, doors open as you contact their handles, and you're pursued by blue goblin guards who detract from your energy on touch. The rooms are a bit bare, appearing as the rear and two side walls, but the 3D perspective changes as you move are excellent. There are spells to gather and activate. Some will summon a servant who can open chests for you, which gives you access to other spells.

Following its superb *Storm Warrior* on the 64, Front Run-

ner has released an educational program *Space Professor*. You must work out the answer to a sum at the foot of the screen, then destroy as many spaceships as possible which contain the wrong answer. Ships showing the correct answer are friendly and should be allowed to land.

Strangeloop is a massive arcade adventure spread over dozens of screens. It's a bit like *Psytron*, but you must collect various objects and use them to complete your mission. Very slick, multi-colour animation, should do very well.

Hustler is the Bubble Bus conversion of its well-received Commodore 64 game. The rewrite has a new feature — spin. Four different types of spin can be selected, top, bottom, left and right. We'll be carrying a full review shortly. The game is to be converted for the MSX range in the near future, and there's to be a new Commodore 64 game called Cave Fighter before Christmas.

Avalon	7.95	Hewson 0273 693 640
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Strangeloop	7.95	Virgin 01 727 8070

COMMODORE 64

Mastertronic, publisher of budget software, has announced that its Commodore 64 games will be available on

disk at £5.99. Titles include *BMXRacers*, *SpaceWalk*, *Duck Shoot* and *Vegas Jackpot* and the company's new release

Chiller. Future releases will use a fast loading system, which rather makes the disk versions redundant.



Gumshoe is a novel graphics/arcade adventure, with touches of *Manic Miner/Kong*. As the detective, *Gumshoe*, you search an apartment block for a kidnapped heiress. There are lifts, trapdoors, laundry chutes and armed hoods out to get you.

The graphics are excellent, the animation among the best we've seen for a long time — but it's too bad about the sound. The scoring system is neat: you start with \$500, bullets cost \$2, there's a \$10 bonus from the heiress's father for each baddy nailed, and a bonus for finding the girl herself. Fisticuffs are common and win or lose there's \$150 medical expenses to pay. Good stuff.

CRL's latest, two sports simulations, are versions of *Golf* and *Cricket*, but the screen handling leaves much to be desired, the action's rather slow and the controls overly complex.

The Virgin Games follow-up to *Falcon Patrol* has improved graphics and a wider range of computer controlled enemies which are hard to beat. Plenty of action here.

Terrorist may feature chunky graphics but it is origin-

al. Your brief is to discover sites of terrorist attacks, prevent them or fight. It's a complex action-strategy game which would have been more of a real winner if it weren't for the poor graphics.

Sorcery is a *Manic Miner/Atic Atac* variation with 17 screens. Some of these have more than one exit, so solving the puzzle isn't too easy. It's a good game with fast and well-designed animation.

Beyond's four games will be reviewed in *PCN* soon. *Ankh* is a puzzle adventure which involves fast responses and a quick brain. *My Chess II* gives nine levels of play with 3D graphics views of the board, from either the rear or the side. *Aztec* is an arcade-adventure, where you control a running, jumping crawling figure who must pass through various perils, searching for a golden idol. When the game loads, an eight-level adventure is selected from a library of 32 scenarios, so there's plenty of variation. Finally *Mr Robot* is unusual in that the A-side of the tape contains a 'constructor set' which allows you to create and play the game in your own screen designs.

Lazy Jones casts you in the role of a work-shy hotel cleaner. Behind 18 doors are chances to shirk your duties by playing games, drinking in the bar, anything to keep you away from the irate manager or the ghost of the previous manager.

Terrorist	7.95	Virgin 01 727 8070
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Falcon Patrol II	7.95	Virgin 01 727 8070
Lazy Jones	7.95	Terminal 061 761 4321
Gumshoe	7.90	A&F 0706 341111
Ankh	8.95	Beyond 01 837 2889
Aztec	8.95	Beyond 01 837 2889
Mr Robot	8.95	Beyond 01 837 2889
My Chess II	8.95	Beyond 01 837 2889
Cricket 64	7.95	CRL 01 533 2918
Golf 64	7.95	CRL 01 533 2918

Sharpe MZ-700

Universal Q/A is an educational program which allows titles, headings and up to 99 questions and answer pairs to be defined by the user. October will see the company's business software,

the word processor features word-wrap and spelling correction, while the graphics program will enable you to use all 500 of the machine's graphic characters with ease.

Universal Q/A	5.95	Maysoft 0206 572772
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PILOT IN COMMAND

Stack in a rut with Basic on your Commodore 64? Try Pilot for a new direction and fresh approaches in 64 programming, says Bryan Skinner.

Pilot-Plus/64 is a language interpreter for the Commodore 64. The Basic supplied on the 64 is pretty poor, but there are extensions on the market. You can buy well-known languages such as Pascal, Forth and Lisp and Comal (issue 77) but Pilot is relatively little-known.

Documentation

Unfortunately, there's more to the language than can be adequately explained and demonstrated in a narrow, 31-page booklet. This is one area where the booklet falls down — not enough to hack in. That said, the details of the commands are just about adequate for someone coming from Basic. There are a couple of demonstration programs on the surprisingly short tape, and details for backing up to disk are given.

Features

Pilot is quite an easy language to learn and to get to grips with, and this version can even make use of the 64's sound. Like CBM Basic there are no advanced graphics commands but since POKE is supported, and because you can call Basic from Pilot and vice versa, you could splice in some Basic sprite routines to be called from within a Pilot program.

As with Basic, Pilot needs line numbers, and the editing commands are many and varied: there's a full screen editor, and commands like RENUMBER (new, old, increment), DELETE (range), NEW, LIST and SAVE. PLIST lists the current program to printer, FIND finds and lists all lines containing the characters given and GOTO (label) and RUN (label) execute a program from a procedure label, not a line number. To polish off these tasty toolkit commands there's even AUTO for automatic line numbering in selected increments and VERIFY for validation of saved programs. All in all an impressive range of utilities to gladden the heart of many a 64 programmer.

But the resemblance between Basic and Pilot ends there. A Pilot program bears little relation to its Basic equivalent. Pilot-64 uses a system of what are described in the manual as 'op-codes' which are followed by a semi-colon and which can be modified by a following letter. For example, r: is the equivalent to REM, a: means more or less the same as

INPUT, t: means PRINT and so on.

In addition, there are some very useful constructs which would take more than a few lines of Basic to emulate. For example, — 'm:dog!cat!horse!mouse' attempts to match the contents of the 'answer buffer' with each entry in the list. If a match is found, the code 't:You're right' will display the message following the colon, and translates as 'if the match flag is set, print the following message'. The jump command (j:) can be modified to force a jump to the last accept statement, the last label encountered, the next match statement or the next problem statement. Procedures are supported and are defined by an asterisk and a label (see Figure 1). Figure 2 shows some of the commands available.

Modifiers are specific to commands, th: suppresses carriage return after text is printed, just like the semicolon at the end of a PRINT statement in Basic. tr: PRINTS text in reverse field, tn: displays text if the match flag isn't set, as: accepts a single key press and so on. The screen handling command can be modified to clear the screen (sc), move the cursor up (su) etc. There's s@ for PRINT@ or LOCATE, and a graphics mode whereby the screen is treated in double density (80x50) and commands for setting, unsetting and testing points are provided. u: (use) calls a subroutine, and the 'b' modifier specifies a subroutine in Basic. SYS 32768 returns control to Pilot. It's surprising how powerful the use of a set of commands and modifiers can be made.

Pilot supports all the data types of CBM Basic — variables include real integer, string and array. Variable names can be of any length, but unfortunately, only the first two charac-

ters are significant. You can use string variables just as in Basic, eg INPUT AS becomes a:as. There are reserved variable names — ti (the clock), tis (the clock in HHMMSS format), aas (the holds the user's last input; aa% (a useful one this) logs the number of times the last question was answered. This underlines Pilot's main use as a vehicle for the development of learning packages, though complex programs can be written quite easily.

To make sounds you must first set up the SID chip with ps: which is the ROKE command redirected by the SID modifier to set up other sound characteristics like attack/decay, sustain/release and so on. The sound effects command is passed three arguments, as in fx:1,440,60 which plays a sawtooth tone in voice 1 for one second.

However, where Pilot really scores is in its simplicity. For programs of the question and answer variety I know of no equal. The built-in features make programming a doddle. You can even use wildcards in the arguments for match, so having accepted (INPUT) an answer you can use m:p*t to test for 'pit', 'pot', 'pat' and so forth. m:Peter&wolf will test for the two words in sequence somewhere in the input buffer, and there are many other variations.

Verdict

Pilot lends itself especially to developing computer-assisted learning (CAL) packages, but can be used to develop complex programs. The facilities would make it an excellent method of coding adventure programs, for example. It's quite easy to learn and to use, even if the documentation a bit sparse.

There's room here to the package than we've room here to describe, and I recommend it wholeheartedly.

REPORT CARD

Features	●●●●●
Documentation	●●●●○
Performance	●●●●○
Overall value	●●●●○

Name Pilot-Plus/64 Price £29.95 Application Language Interpreter Publisher Sigma Technical Press, 5 Alton Road, Wilmslow, Cheshire SK9 5DY Author Ariadne Software System Commodore 64 Other versions None Format Cassette Outlets Mail order/retail

Figure 1
Sample Pilot program

```
10 r:here's a simple program
20 $begin t:Guess an animal.
30 a:
40 m:cat!dog!horse!cow!toad!r!r!d!v!ark!
50 t:You got it
60 $?
70 t:No, @##$@ isn't one I know.
80 t:Try again?
90 a:
100 t:
110 m:
120 j:y!begin
130 $:
```

Figure 2
Some Pilot commands

```
a: INPUT (up to 80 characters)
c: LET
d: DIM
e: END
fx: Sound effects
h: Hard copy (like LPRINT etc)
j: GOTO (see text)
m: Match (see text)
p: POKE (see text)
r: REM
s: Screen operations
t: PRINT (can be modified - see text)
u: Use subroutine
```

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PC XTRA

Pision's integrated software suite for the IBM PC comes under Geoff Wheelwright's scrutinising gaze.

Pision's Xchange integrated software suite for the IBM PC, Apricot and Sirius micros goes on sale this month. The applications within Xchange are all adaptations of the program sold with the Sinclair QL (see box); a word processor (Quill), a database (Archive), a spreadsheet (Abacus) and a business graphics system going under the name of Easel.

The big difference between the QL packages and the software released this month is the price — £495 for the four modules, though each can be purchased individually for a good deal less (Quill — £175, Abacus — £175, Archive — £250, Easel — £175). But for the serious user, the QL connection will largely be nothing more than an amusing curiosity.

The differences between Xchange and its Microdrive-based forebears will in the end be less important than the differences between Xchange and other integrated software suites such as Ashton-Tate's *Framework* and Lotus' *Symphony*.

Pision presents the 'building block' approach for Xchange as a big advantage over other integrated suites, which charge you a big price and give four applications or more all at once — whether you want them all or not. With Xchange you buy new applications as you need them and each new application still works within the Xchange system to exchange data. But you still need 256K before you start using Xchange.

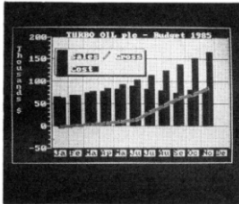
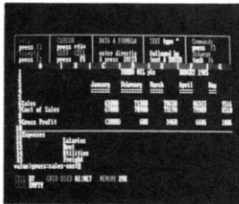
I tested the 0.8 release of the full four-package Xchange suite.

In use

Pision has designed the documentation so that it's both portable and easy to follow — without being inconsequential. It comes in a hard plastic case which has a secret panel in its 'lid' containing the program disks. A nice touch, and one other software manufacturers might consider.

Once you've backed up your disks and installed Xchange, you're greeted with a sign-on menu offering you a choice of tasks in either Quill, Abacus, Archive or Easel.

Once you've picked a task — Quill's word processing, for example — you give the task a name. From then on, you can use Quill in much the same way as any other word processor. This one has on-screen page breaks, automatic on-screen word-count, automatic margin



adjust, headers and footers, import/export and more. And if you suddenly decide you want to do something else, say check on information in the spreadsheet, you just hit F6 (function key six) and then ESC (the Escape key) to get back to the sign-on task menu. You then enter the spreadsheet and work with data in it without losing your word processing file.

Xchange's most notable feature is the virtual document system used to store files in memory and on disk. This system organises your file so that it's not only unlimited in size, but can access page 2 quickly as page 200.

Windowing

There are, however, no on-screen applications windows in Xchange so you can't see a word processed file at the same time as a spreadsheet file. This kind of windowing is available on competitive products such as *Symphony* and *Peachtree's Decision Manager*. But Pision revealed that it has held discussions with Microsoft about incorporating the company's Windows operating system with the Xchange software.

Xchange's design apparently fits within the code parameters of Windows and should be able to give Xchange that windowing facility. You still have to pay Microsoft for the Windows software.

Verdict

The suite's design and documentation is

good, but is there really a place for a window-less integrated software suite with the same price-tag as *Symphony*, *Decision Manager* and *Framework*? Xchange also offers fewer applications than most — the average integrated suite offers five, with the fifth generally being a communications package. Pision has, however, promised that the first additional application module for Xchange will be a communications package.

On the plus side, information exchange between the programs is good and the quality of each of the individual applications is high — particularly the word processor.

Pision's apparently confusing price structure does seem to have strategy behind it. The company could even end up being quite flexible with it. Pision says a number of OEM (Original Equipment Manufacturers) hardware/software bundling deals are in the pipeline, the first of which will be Torch's Graduate for the BBC Micro. Some hardware companies have decided the Perfect range of software isn't so perfect. Pision may well be the next king of bundling.

REPORT CARD	
Features	●●●●●
Documentation	●●●●●
Performance	●●●●●
Overall value	●●●●●

The QL connection

The QL software and Xchange are similar enough to look like twins — but fraternal, rather than identical.

The crucial difference, as far as using the package is concerned, is the task table/exchange facility. Although you can import and export data between packages in Quill, you must do it 'manually' by exporting to an export file from one application, then closing down that application and start up the importing application and import the file. It's slow, but it works in much the same way as the Xchange facility.

What is different is the task table, which gives you the ability to switch between several different tasks all running in the machine at once. In the QL software, you can run only one task at once and cannot switch between applications without closing down and reloading.

In their individual operation, however, the applications work in exactly the same way and having used the QL packages I didn't even read the manuals to get the Xchange software going.

In one of the provisional IBM versions of the software, some of the menus still referred to QL keys instead of IBM keys — but all those references were removed in the final version.

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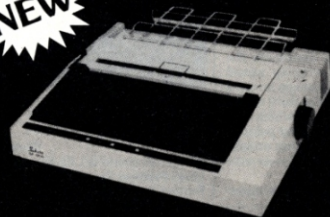


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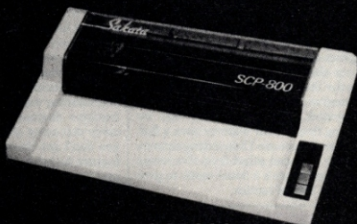


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BBC B

CUSTARD PIE FIGHT

It's a showdown. The two opponents meet armed not with guns but with custard pies. Ready, steady and splat.

Custard Pie Fight is a simple arcade type of game. Your aim is to hit the other person with a pie four times in a row — and you win a game. One or two people can play this hit-and-run game.

With nine levels of play, I chose the easiest. Playing at this speed was so slow I had time to scratch my head and it wasn't hard to hit my man.

Level one proved the most difficult to

master. If you're not quick enough you get custard all over your face and the impact is so strong you fall flat on your back.

If you're playing against the computer at level one, you sometimes don't even get time to move off the spot before you're hit — so as might be expected, I didn't win too many games at this level.

The game would be more difficult to play if you could fire your pies continuously. The snag is you can only throw a pie once your opponent has thrown theirs. At the slower speed there's time enough to dodge around the screen.

The only taxing level in this game is one. And once you've got the hang of the



MISS

quick finger-work there's nothing left to accomplish.

The concept of the package is far from original.

Sandra Grandison

Price: £4.95 Publisher Comsoft, 0532-665621

COMMODORE 64

QUO VADIS



HIT

The increasingly popular arcade/adventure style game is probably shown at its

best in *Quo Vadis*.

Hidden somewhere in a myriad of caverns is a magic sceptre. Find this and take off safely with it and you win a real gold and silver sceptre.

The opening scene shows you, a knight, clinging to a rope in a vertical shaft. As you move the screen scrolls past with the knight at dead centre. Climbing down, you'll see several openings to left and right. You must time your leap carefully to gain access to one of these side caverns, only to be attacked by flying beasts. Firing is automatic in eight directions as you move, so making them clouds of dust isn't too tricky. If they touch you or breathe fire on you, bang go valuable points.

You'll come across 38 types of monster ranging from what look like macaws to snakes and winged devil-masks. More likely they'll come across you as they appear out of nowhere when you enter their domain. Killing them may take up to three hits.

The background tune shows the 64's sound to advantage and the graphics are well-done and move smoothly; however, the screens are bare and only two colours at a time is the norm. The main attraction of the game has to be the splendidly generous 118 caverns to explore.

Bryan Skinner

Price £9.95 Publisher Softek 01-240 1422

COMMODORE 64

STORM WARRIOR

This is one of those little gems you come across occasionally, full of atmosphere and originality. It's a machine code graphics arcade-adventure, and as such is a cut above many.

As the Storm Warrior you're a Samurai armed with a white staff. Movement is by joystick, and you strike out by pressing fire. Storm Warrior uses a fast loader and there are 12 daunting screens of action. You can select from five levels of play and there's a demo mode to give you some idea of tactics.

On the first screen a devil figure leaps from platform to platform above you, hurling missiles at a coruscating fireball. You can redirect the path of the ball by striking it with your staff. Points are scored if you can make it hit the demon, without being nailed by his bolts.

In screen two you find yourself in a storm, lightning bolts illuminate the sky and you're faced with an armed warrior blocking your passage across a shimmering walkway. The third screen features descending birds which will carry you away as well as your points if you don't get them first. Other screens feature scorpions, labyrinthine caverns and much, much more.

The background music sounds vague-



HIT

ly classical and the graphics are a bit sparse and coarse, but the flashing lightning etc adds to the mood.

Bryan Skinner

Price £7.95 (cassette), £9.95 (disk) Publisher Front Runner 01-992 8055

BBC B

XANADU COTTAGE/EBONY TOWER



HIT

Xanadu Cottage and Ebony Tower, two

text adventures on a single cassette, make up this bargain release.

In *Ebony Tower*, you must search for and exterminate a dragon, releasing a ransomed pixie king on the way. In *Xanadu Cottage* you are not told your mission. These are text-only adventures, although *Ebony Tower* has one or two simple sound effects.

Of the two adventures, I much preferred *Xanadu*. It has meaty location descriptions and the author displays some humour. For example: should you attempt to climb a tree in the ancient oak woodland, a branch will snap off whereupon an irate conservationist will emerge from the bracken and beat you

over the head with it.

The plot involves a deserted cottage from which you start exploring. As with most adventures, there's an underground maze to be mapped. This labyrinth has a nasty ace up its sleeve. Dropping an object, to mark each room uniquely, is out — the article falls into an underground river and is swept away.

Ebony Tower is more suitable for the tyro adventurer, although it does have some interesting puzzles.

Both games on the one cassette at under £8 represents good value.

Bob Chappell

Price £7.95 Publisher Alligata 0742-755796

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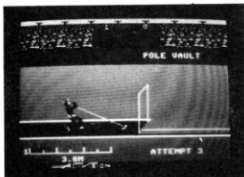


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COMMODORE 64

DECATHLON



Up to the winners' rostrum steps Activision's *Decathlon*, a ten sport simulation for the Commodore 64 (Spectrum version coming soon). A great all-rounder, it

COMMODORE 64

Winner of the Olympic silver medal must go to *Daley Thompson's Decathlon*.

This is available for the Commodore 64 with a Spectrum version almost ready. The events you take part in are: the 1500 metres, long jump, shot putt, high jump, discus, pole vault, 400 metres, hurdles, javelin and 100 metres.

In arcade fashion, you start with four lives — every time you fail to qualify in an event, you lose one. This certainly gives you an incentive to do better because that's the only way you're going to see all the events.

You take charge of a Daley Thompson

allows you to tackle all ten events in succession or to stay with a single event. Up to four players can compete.

The games take place in front of a grandstand filled with static spectators. For the track events, there are twin red running tracks and two similarly garbed athletes (one athlete is controlled by a player, the other by either the computer or another player).

These two tracks scroll independently of each other — and at times you may think you're breathing down your opponent's neck but a quick look at each track's distance marker may indicate otherwise. A single track and athlete appear in the field events — the athlete controlled by the 64 doesn't take part.

The movements of the athletes are superbly done, smooth and natural like a

fully-animated cartoon. The game undoubtedly sets a new high in home computer animation.

Your athlete is made to run by simply wagging your joystick as fast as possible. In certain events, the only other thing you'll need to do is hit the fire button but timing is crucial.

The pole vault is great fun. You waggle away to get your athlete running at top speed, hit the button to launch him, waggle some more to give you extra thrust then fire again to make him let go of the pole. You'll need a similar technique in the hurdles.

There are few sound effects but the stunningly realistic graphics definitely take the gold.

Bob Chappell

Price £9.99 **Publisher** Activision, 0628 72448/32839

clone who competes in races against a mere computer-controlled athlete, and in other events, on his own. For each event, a detailed board provides information on the qualifying time/height/distance required, the Olympic record, your best attempt, etc.

While joystick wagging and button pressing are the order of the day, the duration of the latter has a marked effect on such things as angle of throw, etc.

The graphics, though attractive, do not give a realistic impression. However, the three-layered scrolling does add extra depth to the proceedings.

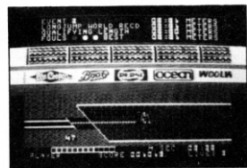
To compensate, there is a catchy Olympic theme tune, a cheering crowd, and a couple of neat touches. For

instance, in the long jump, the referee crawls out and measures the distance jumped.

Pretty good stuff, but not the big G.

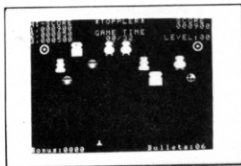
Bob Chappell

Price £7.90 **Publisher** Ocean 061-832 9143



DRAGON

TOPPLER



Toppler is a cross between the fairground style shooting galleries and one of the more recent Heineken adverts where the ducks shoot back.

The game starts with a bit of fairground music and three rows of targets. There are 27 targets and you get 45 bullets. If that sounds like a cinch, don't forget you rarely win at the fair.

There are two pitfalls to avoid — some of the targets are bonus cards. If you can clear the screen by hitting everything except these, you'll get a bonus of 5000 points. But hit one card and all the others turn into ducks. Every time a duck goes off the screen he gobbles up five bullets.

All the missed targets re-appear at the top of the screen, and it's quite a job to keep up with them. Should you manage to clear the screen, you get eight minutes to boost your score by hitting Tommy the Tank. He trundles across the screen and every time you hit a wheel, he changes direction and you get another 100 points. If you can't stop him crossing the bonus screen, the game ends.

A very frustrating game, which seems to have that 'just one more go' quality to it. I'm glad I didn't have to pay for each round as I'd be broke.

Jim Ballard

Price £6.95 **Publisher** Orion Software, 38 Trencham Road, Coventry

DRAGON

OPERATION SAFRAS

Rupert Pettigrew, the Shards answer to Dan Diamond is off on his travels again.

The object is to retrieve the Safra's sword from the enemy and return the sword to its rightful home.

Stage one requires considerable observation and some thought to get the code for stage two, which is the adventure proper. In stage two you have to track down and rescue five agents (as well as the sword). You only have a limited supply of money and time. Fortunately you only need to travel

around mainland Britain.

Four modes of transport are offered: flying, train, hitch-hiking and driving a car. Flying obviously saves you precious time, but costs a fortune and hitching saves the pennies at the expense of time. After many attempts I rescued all the agents and eventually found the sword. The code is given to you straight and it's on to stage three.

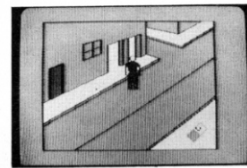
The final part is more lighthearted and the emphasis is on sound and graphics (as it is in stage one). Eight tasks have to be completed before you can get the sword home.

The sound (created on Shaper — Shards' own sound effects program),

graphics and presentation is a distinct improvement on *Pettigrew's Diary*. Good value for money.

Jim Ballard

Price £7.95 **Publisher** Shards Software 01-514 4871



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40 BEST MACHINE CODE ROUTINES FOR THE 64 by Mark Greenshields

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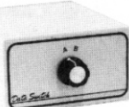
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STAR GAME



SPECTRUM

WANTED: MONTY MOLE

The miners' strike will have made somebody some money if this strife-inspired game gets the success it deserves.

Monty Mole is so desperate for coal that he carries out a daring raid on his local pit. Monty grabs a bucket and proceeds to cope with the various hazards involved in this enterprise. The perils he must face include flying pickets, coal crushers, drills, hair sprays and, if you hadn't guessed it from the latter, King Arthur himself.

To the tune of Colonel Bogey, the game begins above ground, at the entrance to a

coal mine. Monty is a chubby, black mole who can toddle, leap and, unusually for such a creature, shin up and down ropes and pipes.

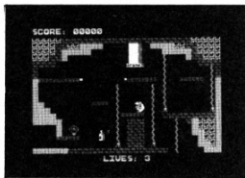
On the far side of the screen is a steaming bucket which someone has left outside the pithead office. Monty needs the bucket to collect his coal and to get it must leap across an incompletely bridged pool. He must also avoid being beamed by a red squirrel mischievously dropping nuts the size of boulders from a nearby oak.

As soon as Monty grabs the bucket, a burly miner pops out of the office in pursuit of Monty who must escape back the way he came and on to the next screen. Monty turns white on subsequent screens — and so will you when you see what you're up against.

Monty has three lives. Whenever one is lost, a few bars of 'Abide with me' play before you get going again. On the first screen, this is a little annoying as it slows the pace down. On other screens, the music thankfully finishes much sooner.

The rest of the game consists of a series of *Jet Set Willy* type screens where the challenge is to collect coal and find a way through to another screen. According to the inlay, there are 21 levels in all, enough to keep you occupied for quite some time.

Various objects cause Monty no end of



trouble. Flying hairsprays, moving platforms, mobile drills, mole-eating fish, candles, bricks, swords, ghosts, miners' helmets and an underground railway are all waiting for Monty to make just one false move.

Although I never got there, the game is reputed to contain Arthur's castle wherein sits a fiery figure seated on a graphite throne — remember, this isn't Camelot.

Gremlin Graphics has also released a version of *Monty Mole* for the Commodore 64 but apart from the first screen, it could almost be a different game, so unlike are the screens and content.

Both versions have lively graphics and animation and, in true platforms and puzzles tradition, are good entertainment. **Bob Chappell**
Price £6.95 Publisher Gremlin Graphics, 0742 753423.

DRAGON

RED MEANIES

Red Meanies isn't a political power game, it's more a version of Pac-Man played at ground level.

You are dumped in a maze, and must run along corridors gobbling up red cheeses. Like all good mazes, the routes all look the same and it's incredibly easy to get lost.

There's only a limited supply of cheeses, but apart from the red ones, there are a few green ones too. Green cheeses make red meanies (who will eat you) turn blue. Blue loonies are harmless and edible. While the green cheeses turn all the meanies blue, everytime you

eat a blue loonie a new red meanie will appear and stay red unless you can find another green cheese to eat.

Confused? Just wait till you play the game. Using the keyboard you press F to go forward, and a comma or full stop to turn right or left. All the keys are auto-repeat, so if you're not careful, you'll run headlong into a red meanie.

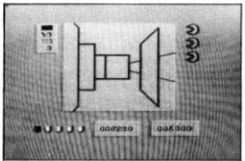
The number of cheeses of either colour left in the maze is displayed and when all cheeses have been eaten, a new supply is delivered. There is also an indicator of how many meanies are red/blue and how many of your three lives are left.

A good game with some neat fast graphics plus Salamander's usual high quality packaging. My only niggle was the *Hitch Hikers Guide to the Galaxy*

style instruction sheet. It's fine if that sort of thing appeals, but if it doesn't then reading the instruction — or trying to — becomes a bit tiresome.

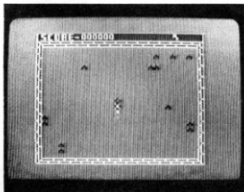
Jim Ballard

Price £7.95 Publisher Salamander
0273 771942.



DRAGON

MAD MONTY



Just when I thought I'd seen all variations of caterpillars running around like demented clockwork mice, here's yet another frantic game, *Mad Monty*.

In this version, you whizz around a garden eating frogs, mushrooms and toadstools. Every time you eat a frog another toadstool appears. But if you eat the fungi in the wrong order, or if you collide with the garden wall, it's a life lost.

As there's little difference between toadstools and mushrooms — apart from colour — it took me some time to get the energetic little beast to eat in the right order. Instead of getting fatter, the caterpillar grows longer and therefore harder to control.

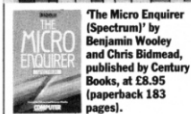
The mushrooms always appeared close to the wall, and more often than not, despite my frantic finger tapping, the caterpillar just went kamikaze-like straight into it.

There's no joystick option and irritatingly the Break key isn't disabled, so as you use the cursor keys it's easy to stab the wrong button in error. Five speeds are offered, from fast to suicidal.

Gobble up all the frogs and you get promoted to the next level. I only hope all the caterpillars don't hatch out next spring into a rash of *The Butterfly Bites Back*.

Jim Ballard

Price £7.95 Publisher Screenplay 134 St Vincent Street, Glasgow.



A team made up of the sometime editor of a magazine with all the answers and one of its contributors should be well qualified to act as micro guides. After all, they know the questions that everyone wants to know the answers to.

In fact, answers to past editions of *Computer Answers* have been cut out, cut up and put through the grinder with permitted additives and colouring. The material consists largely of adapted and updated Spectrum pieces from CA.

The book is one of four guides — to the Spectrum, Commodore 64, BBC and Atari XL — all sharing the same encyclopaedic style. Much of the information is also common to all four, leavened with coverage of topics specific to the machine of the title. The text is well presented and the style is eminently readable.

Subjects are dealt with in alphabetical order from analogue through to word processor. Sub-sections are headed with a vibrant primrose tint as though someone had gone through with a yellow marker pen, and it colours the plentiful diagrams and listings, too. The routines mean you can learn about your machine by doing things, as well as by reading about them.

This is an authoritative, easy to use handbook/reference guide to the Spectrum. HA



'Getting Started With Basic', by John Parry, published by Phoenix Publishing Associates Ltd at £5.95 (paperback, 141 pages).

I would have thought that all approaches on how to get to grips with computers had been covered — but *Getting Started With Basic* seems to think it's found something new.

John Parry tries to bring home to the beginner the essentials of computers: he asks 'Why

call it a program?' and then discusses a washing machine program in relation to a computer.

He explains — in a long-winded fashion — the keyboard and cursor. Then he looks at Lets, Ifs, Thens, string arrays, sub routines and so on.

At £5.95 there's nothing outstanding about this book. There are no pictures or illustrations to liven up and add to the text. And there aren't too many programs to get you tapping away at your computer.

At the beginning of each chapter a brief quotation is given — I suppose to highlight what's going to be discussed. Here's one that will set you thinking in chapter 14, Working Through.

'LORD SANDWICH: "You will either die at the rope's end, or of the pox."

MR JOHN WILKES: "That must depend on whether I embrace your lordship's principles or your lordship's mistress."

In 15 chapters you'll get a taste of what a computer is but that's about it. SG



'Interfacing the BBC Micro', by Colin Opie, published by McGraw Hill at £8.95 (paperback, 195 pages).

The BBC micro is one of the most interchangeable micros currently available, due mainly to its user port, and the documentation that goes with it. If you have read all the books that tell you about programming, that sketchily describe ways of attaching your computer to the big wide world, then this is probably the book for you.

The book is divided into three main sections. The first describes the main parts of the system I/O (input output) and in addition, Boolean logic, the processor and its pin out, the connections, the analogue port (including light pens), interrupts, the RS423, the video processor, the user port, and the 1MHz bus.

It was at this point that I began to get an idea how comprehensive the book was, especially as each chapter in this section has its own bibliography.

The next section covers all of the above things in more detail with example routines and internal chip descriptions. It starts with the user port. The 6522 VIA is covered in a fair amount of detail with descriptions of how to use all the registers and timers. A

number of machines use this chip and anybody who owns one could benefit from a glance at this section. The book then deals with interfacing light pens, and using the analogue inputs — not in quite so much detail, but perfectly adequately.

This section closes with the RS423, centronics port, and the 1MHz bus. The latter gives a few details on Fred, Jim and the lines that are labelled in the manual but don't mean a lot.

The final section of the book gives a selection of construction projects, including a motherboard. Unfortunately, this is where the book gets a little vague. Only the barest design details are given, for the motherboard especially, and, since the rest of the daughter designs are constructed to plug into 'mother', it is a bit of an oversight.

In general the projects appear to be good simple ideas, such as a light pen, and an experimental user port. They are followed up in the appendices with a few technical details and artwork for the various projects.

Overall, the book is valuable for its reference qualities. If, like me, you occasionally look at designs for attaching things to your micro, but never get around to building them, then this book is pretty well a must. NG



'Machine Code Games Routines for the Commodore 64' by Paul Roper, published by Sunshine at £6.95 (paperback, 169 pages).

Not the snappiest title in the world but it does the job. If only the same were true of the content. There's a wealth of information in here but you can't help feeling that Mr Roper has been overgenerous. Less breadth and more depth and the book would have benefited.

The first half of the book is a general discourse on writing programs, games in particular, with attention to design, charting coding and debugging. This is valuable stuff from a programmer of some experience.

It is from chapter nine onwards that problems appear. If you read the book (as opposed to using it) you will probably not spot the failings. Mr Roper's style is eminently readable and he talks good sense. This second half is the meat of the title — the routines themselves — but they would be far more useful with fully detailed documentation. Sadly, Mr Roper confines himself to general principles.

The book ends with a number of utility programs, and a game listing that incorporates many of the ideas expounded in the earlier chapters. But you're going to have to work hard to get as much from the book as the author promises.

On the whole I preferred *Machine Code Graphics & Sound* from Melbourne House (reviewed in Readout last week).



'Graphics for the Commodore 64 Computer' by Jeff Knapp, published by Prentice/Hall at £11.65 (paperback, 140 pages).

It is pretty obvious that any owner of a Commodore 64 would simply love to write programs with graphics as good as those you can buy in the shops. However, as soon as you try to use any of the graphics the problems set in.

No graphics commands exist within the Basic and the manual supplied with the machine doesn't really help. Graphics for your Commodore 64 try to solve this problem by introducing the reader to each of the graphic subjects in turn. If you wish to use sprites then you'll find a section on using them; if you want user-defined graphics you'll find instructions on how to design them, and use them to ease your games programming.

Another subject that is explained is the use of interrupts. This is a subject that is only just touched in the manual, this book explains how to use the interrupts within your own programs. Once you understand their use you should be able to do such things as changing the screen mode at any point.

The book deals with one subject at a time, each section consisting of a discussion of the subject in question, including how to use the associated system variables, and a program that demonstrates exactly how you use them.

Even though the sections are clearly defined, and the subjects are extremely well discussed, the book does hold one major disappointment — none of the programs is documented. This is a major failure as the only way really to learn what they are doing is to go through the programs line by line making your own comments — which should have been done by the author.

Even taking the gripe into account this book is good — a few hours reading and making notes on the programs should reap their own rewards. SC

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There's Yahtzee for 64 owners, a bright new version of the old Oriental dice game; Music on the Oric, with a Bach at least as good as its byte; and programs for users of Spectrums, BBCs and QLS.

All-star cast

We present an exclusive review of *Suicide Express* from Grem-lin Graphics and there's a look at Mastertronic's *Chiller*.

SYNTAX ERROR

Adventure games are supposed to be a challenge, but there is a limit. Amstrad users who hacked in *The Treasure of Middle Earth* from issue 76 will probably have reached it. The solution, which we humbly offer now, is to add to line 910 so that it reads:

```
910 IF P% = 34 AND R = 8
      THEN PRINT X$(25);
      S%(34,3) = 35;          b%(5) = -1;
      b%(27) = -1
```

To get past the irritating man who says: 'You won't get past me that easily!', try changing line 870 to read:

```
870 IF P% = 27 AND (R = 1 OR
      R = 2) THEN PRINT X$(41);
      S%(27,2) = 39;          S%(27,3) = 28;
      G$(22) = X$(58)
```

In this line, changing R = 1 OR R = 2 to R = 18 OR R = 19 may also be helpful.

A PC's lot ...

Alone, homeless and unloved, a micro sits in the auction room waiting for bids. Fallen on hard times, it rubs shoulders uneasily with Sharp assemblers and slightly foxed Spectrums. But lot 271 comes round and passes by, withdrawn for want of serious offers. The bidding moves on to upstart disk units and bundles of games.

What is it, this micro that nobody wants, that hides its light under a bushel (or at least, under several pecks) of protective polythene? Why, it's everybody's favourite micro, the IBM PC. Sic transit gloria... Well, it wasn't on its own — nobody wanted a new Mac either.



Free quotation

Journalists are always being accused of quoting people out of context, so here's one to savour from Com... the UK's general manager Howard Stanworth: '... business is in decline — certainly as far as Commodore is concerned!'

Before Jack Tramieel gets too excited we ought to add the rest of the sentence: 'Any industry observer looking at an 86 per cent increase in sales over 1982/3 would be hard-pressed to argue that business is in decline — certainly as far as Commodore is concerned!'

Come to think of it, the statement is vaguely ambiguous...



PCN DATES

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